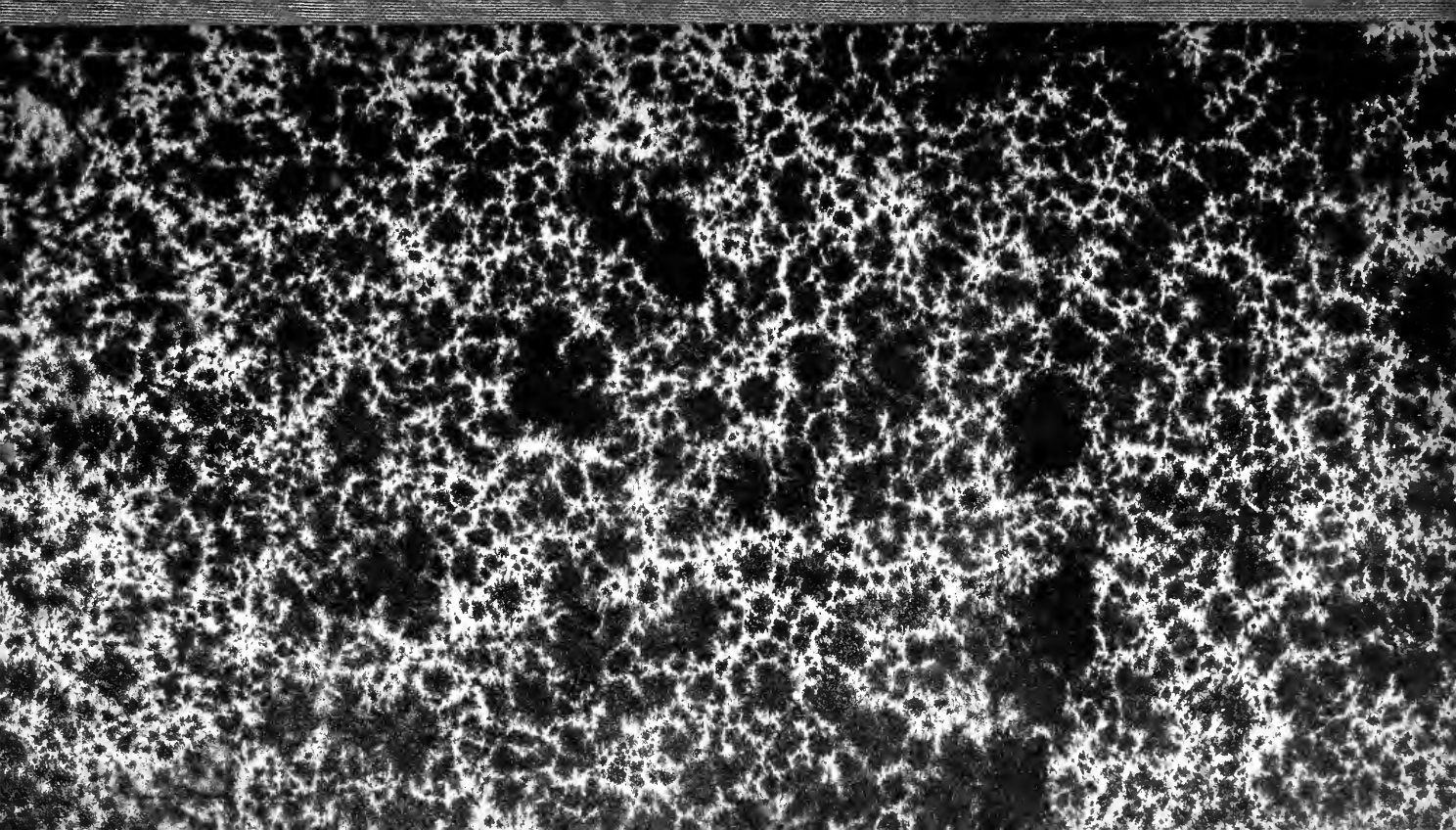

LETTERS

ON THE

UNHEALTHY CONDITION

OF THE

LOWER CLASS OF DWELLINGS,

ESPECIALLY IN LARGE TOWNS.

FOUNDED ON

THE FIRST REPORT OF THE HEALTH OF TOWNS COMMISSION.

WITH NOTICES OF OTHER DOCUMENTS ON THE SUBJECT,

AND AN

APPENDIX,

CONTAINING

Plans and Tables from the Report

(INSERTED BY PERMISSION).

BY

THE REV. CHARLES GIRDLESTONE, A.M.

RECTOR OF ALDERLEY, CHESHIRE.

LONDON:

LONGMAN, BROWN, GREEN, AND LONGMANS,

PATERNOSTER-ROW.

1845.

Price Eighteenpence.

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" To preserve Health is a moral and religious duty. For health is the basis of all social virtues. We can be useful no longer than we are well."— Dr. Johnson.

" Health is a great matter, both to the possessor of it and to others. On the whole, that humorist in the Moral Essay was not so far out, who determined on honouring health only; and so, instead of humbling himself to the high-born, to the rich and well-dressed, insisted on doffing hat to the healthy: coronetted carriages, with pale faces in them, passed by as failures, miserable and lamentable; trucks with ruddy-cheeked strength dragging at them, were greeted as successful and venerable. For does not health mean harmony, the synonym of all that is true, justly ordered, good? is it not, in some sense, the net total, as shewn by experiment, of whatever worth is in us? The healthy man is a most meritorious product of nature, so far as he goes. A healthy body is good; but a soul in right health, it is the thing beyond all others to be prayed for; the blessedest thing this earth receives of heaven."— Carlyle.

London:
Printed by A. Spottiswoode,
New-Street-Square.

PREFACE.

THE age and country in which we live are distinguished by the successful application of mechanical skill to the conveniences and comforts of our animal life, and by the almost exclusive devotion of public attention, enterprise, and capital, to mechanical devices and pursuits. Under such circumstances the outward frame and condition of man is apt to assume an undue prominence, as compared with his inward being; and those who regard themselves and their fellow creatures in the light of spiritual energies, rather than as mechanical bodies, will often find it their best way of doing good, to take such advantage as they can of the tide flowing for the time, and to aim at forwarding moral and religious objects, as far as possible, by means of the mechanical propensity of the age. This has been the chief object of the writer, in the following letters on a topic in which every man is concerned, and at a period when a very general interest has been excited on the subject. It is indeed difficult to over estimate the importance of health to the moral and spiritual energies of the human being. For though it be true, that we may edify our brethren, and glorify our Maker, by suffering cheerfully and thankfully the chastisement of disease; yet there can be no doubt that we are in a situation to do better service in both these respects in proportion as we enjoy the vigorous use of all our faculties, mental and bodily. Besides, there is a wide distinction between those disorders and diseases which are entailed on us by the infirmity of our nature, the unavoidable penalty of our fall and sin, and those which, by our personal or joint neglect, we wantonly draw down upon ourselves, or on the community of which we are members. That which in the one case may be a spectacle of resignation, meet for men and angels to behold with interest, and approved by the Ruler of the universe, in the other case resembles the acquiescence of a suicide, in his own guilty act of marring his Maker's work, disobeying his will, frustrating his design in the existence of his creatures, and his delight in their health and happiness. Doubtless there are occasions when we must risk health, or even life, rather than violate duty. But ordinarily the obligation to cherish life and health is of paramount force, inasmuch as without these no other duties can be efficiently

discharged. And in every case it is past all question that we ought to exercise a watchful care over these matters, in regard to our fellow creatures. The maintenance of their health, the preservation of their life, are amongst the most obvious of each man's duties to his neighbour. So that it was most properly within the province of Government, in its paternal character, to institute the late inquiries into the excessive sickness and mortality prevalent in our town population, with a view to taking measures of prevention. And it must be no less properly within the province of any private person, especially if a minister of the church, to endeavour to excite interest, and diffuse information, as to the result of such inquiries, amongst those whom the Reports of government commissioners are little likely to reach.

The principal official documents connected with this subject are the following: —

I. The Report of an Inquiry into the Sanitary Condition of the Labouring Population of Great Britain. 8vo. 1842. This proceeded from the Poor Law Commissioners. It consists of replies and returns made by various competent persons, to a series of questions issued for their consideration. These are digested under the following heads: —

1. General condition of the residences of the labouring classes where disease is found to be most prevalent.

2. Public arrangements, external to the residences, by which the sanitary condition of the labouring population is affected; including,

   Town drainage of streets and houses.
   Street and road cleansing — road pavements.
   House cleansing as connected with street cleansing and sewerage.
   Supplies of water.
   Sanitary effect of land drainage.

3. Circumstances chiefly in the internal economy and bad ventilation of places of work, workmen's lodging houses, dwellings, and the domestic habits affecting the health of the labouring classes; including,

   Bad ventilation and overcrowding private houses.
   The want of separate apartments, and overcrowding of private dwellings.
   Domestic mismanagement, a predisposing cause of disease.

4. Comparative average length of life in different classes of the community.

5. Pecuniary burdens created by the neglect of sanitary measures.

6. Evidence of the effects of preventive measures in raising the standard of health and the average length of life; including,

Cost to tenants and owners of the public measures for drainage, cleansing, and the supplies of water, as compared with the cost of sickness.
Employers' influence on the health of workpeople, by means of improved habitations.
By various other means.
Effects of public walks and gardens on the health and morals of the lower classes of the population.

7. Recognised principles of legislation, and state of the existing law for the protection of the public health; including,

General state of the law for the protection of the public health.
State of the special authorities for reclaiming the execution of the laws for the protection of the public health.
State of the local executive authorities for the erection and maintenance of drains and other works for the protection of the public health.
Boards of health or public officers for the prevention of disease.

8. Common lodging houses the means of propagating disease and vice.

9. Recapitulation of conclusions.

With an Appendix of papers upon various points connected with the above considerations; and several tabular statements, and illustrative plates.

This Sanitary Report, as it is often named, has been of the most essential service. But it is by no means as generally known as it ought to be. Indeed, the writer of these letters, though long accustomed to feel a deep interest in the subject, has neither possessed the volume, nor become acquainted with its contents, previous to the present year; a circumstance which seems to warrant his own attempt to give greater publicity to the Report of the Health of Towns Commission.

II. A Supplementary Report on the Results of a Special Inquiry into the Practice of Interment in Towns. 8vo. 1843.

This is signed by Mr. Chadwick, the Secretary to the Poor Law Commissioners; and after an account of the sources of information, and a summary of the evidence, branches out into the following topics: —

Injuries to the health of survivors occasioned by the delay of interments.
The delay of interments among the labouring classes in part ascribable to the difficulty of raising excessive funeral expenses.
Specific effects of excessive funeral expenses on the economy of the labouring classes.
Aggregate expenses of funerals to the public.

Means of diminishing the evil of prolonged retention of the dead amidst the living.
Proposed remedies by the extension of separate parochial establishments in suburban districts examined.
Practicability of ensuring for the public superior interments at reduced expenses.
Examples of successful legislation for the improvement of the practice of interment.
Experience in respect to the sites and places of burial, and sanitary precautions necessary in respect to them.
Extent of burial grounds existing in the Metropolis.
Moral influence of seclusion from thronged places, and of decorative improvements in national cemeteries.
Necessity and nature of the superior agency requisite for private and public protection in respect to interments.
Proximate estimate of the reductions in funeral expenses practicable under national arrangements.

After which there is an Appendix of miscellaneous papers.

III. The Physical and Moral Condition of the Children and Young Persons employed in Mines and Manufactures. 8vo. 1843. Parker, West Strand. (Abridged from official documents.) Contents as follows: —

1. Employment of children and young persons in mines and metal works.
2. Physical condition of children and young persons employed in coal and iron mines.
3. In mines and works of tin, copper, lead, and zinc.
4. Conclusions.
5. Employment of children and young persons in trades and manufactures not included under the operation of the Factories Regulation Acts.
6. Physical condition of children and young persons employed in those trades and manufactures.
7. Conclusions.
8. Moral condition of the children and young persons employed in coal and iron mines.
9. Moral condition of the children and young persons employed in mines of tin, copper, lead, and zinc.
10. Moral condition of the children and young persons employed in trades and manufactures.
11. Exertions to advance, and indifference retarding education.
12. Conclusions.

Previous to this publication and connected with the subject of it, there came out a

IV. Report on the Training of Pauper Children; with several valuable papers appended, bearing on matters

affecting their health, as well as on their education in general. These various inquiries and reports led to the issuing of a commission, to which we owe the volumes which form the subject of the following letters, namely : —

V. The First Report of the Commissioners for inquiring into the State of Large Towns and Populous Districts. 2 Vols. 8vo. 1844.

VI. The Second Report of the same Commissioners, with Appendix, Part I. Folio, 1845. Also Appendix, Part II. Folio. This Report and the Appendices are now in the press, in 8vo., for general circulation; and detached portions of the 8vo. edition, relating to several important towns, are already prepared, and may be obtained by application in the proper quarter. Had the 8vo. edition been complete, reference would have been made to some of the most striking points of evidence contained in it, for the illustration of these letters. But the additional facts brought to light, however numerous and strong, could scarcely have made the case here set forth more clear, or the duties hence arising more conclusive.

In the Appendix to these Letters will be found some woodcut illustrations, for which, as well for an early and ample supply of the various Reports, the writer is much indebted to the good offices of the secretary of the commission. These woodcuts will give some notion, though but an imperfect one, of the pains which have been taken to illustrate the subject in the Reports circulated officially; which, besides many more plans of this kind, contain several large coloured maps and diagrams, most helpful in explaining the subjects of drainage and ventilation, and likely to be serviceable to parties engaged in the construction of dwellings on an improved system.[1]

On a review of this slight account of the progress of inquiry,

[1] "The Directors of the Birkenhead Dock Company, finding that they must either provide accommodation for the numerous workmen required for the construction of their warehouses and docks, or submit to great inconvenience, expense, and delay, in consequence of the want of it, have determined to erect a number of dwellings for their labourers and mechanics. After calculating the costs and returns from various descriptions of cottages submitted to them, they have decided to build according to plans in which each dwelling will have an unlimited supply of water, and a gas light; and all rates and taxes will be paid by the company, the tenant paying one fixed sum per week for all charges incident to the occupation of his dwelling. They consider that by this means the greatest amount of comfort will be afforded to the occupiers that can be combined with a fair return upon the capital invested."

See memorandum at the foot of the plans signed by Macgregor Laird, Secretary; who would supply a copy of them to any person applying.

it appears that the first impulse given to the present energetic movement in the cause of public health is traceable to the amended Poor Law, and to the facts brought to light in connection with that measure. It must also be observed, that we owe much of the certainty and clearness of the conclusions now established to the new system of General Registration; which indicates at once accurately, comprehensively, and accessibly, the proportions of population, sickness, and mortality. These conclusions embrace at once the existence of serious evil, and the means by which it may be largely prevented. If they should lead, as may reasonably be expected, to efficient measures of improvement, we may hope for a result far more valuable than an amended system of relieving paupers, even the prevention of a great amount of pauperism. And the work of registration will have compassed one of its most important uses, if the facts of sickness and mortality, thereby brought to light, have formed a basis on which to calculate the causes, and to suggest the remedies, of influences most injurious alike to the health and morals of all within their reach. In the application of these remedies, it is to be hoped that all classes will gladly bear their part. But it is especially desirable that the clergy should take their full share of this arduous labour. In a case where many prejudices will have to be contended with, they who have the best opportunities of knowledge must be the first to adopt and to promote an improved system. They who are the most conversant with man and with his interests in a spiritual aspect, must be forward to turn into this direction the prevailing taste for physical pursuits. Dispersed as they are every where, throughout town and country, resident in every clime and quarter of the realm, acquainted with the higher classes, familiar with the lower, and having recognised authority as the teachers of both, to reprove them in evil, and to exhort them unto good, they cannot but be responsible, more largely than most others, in the exercise of these precious talents, for the protracted continuance of any evil of this kind, which is once well proved to exist, and also to admit of remedy. It is to them therefore that one of their brethren appeals, in conclusion, with the expression of his earnest hope, that they will cooperate cordially in removing these plague spots of unhealthiness and indecency from the homes of the labouring classes; and will never rest until the abodes of all around them are as cleanly, as wholesome, and as compatible with habits of decency, as their own respected dwellings. There is no more insurmountable barrier, we may rest assured, to the communication of the moral and religious impressions familiar to ourselves, than the diverse, and alien, and repugnant habits of life, forced by adverse circumstances, whether against their inclination or not, on those whom it is our duty and desire

to instruct.[2] Nor would any outward means do so much to forward the success of our teaching, as the extending to every family that which, as shown in these letters, is at present out of the reach of many, but might be imparted to all, namely, the possibility of living, if they are so disposed, in a healthy and decent home.

Alderley Rectory, May 18. 1845.

[2] I am glad to be able to corroborate this opinion, by the following passage from the Report on the state of Preston, in Lancashire, by the Reverend John Clay, the indefatigable chaplain of the House of Correction in that place, whose annual Reports on the condition of the prison are full of the most valuable information, and whose labours in an arduous field of duty, from which he has never absented himself for a whole week together during a space of seventeen years, deserve a more substantial recompence than this humble meed of commendation, from one who knows him chiefly by his good works: —

"We endeavour to civilise distant people by winning their confidence, by striving to develope the better qualities of their nature, by promoting intercourse with them, and making them alive to its benefits: the same measures are needed at home, where the moral and intellectual extremes of society are as far asunder as if separated by untrodden deserts or untried seas. This mental remoteness and local propinquity cannot long co-exist without change; a great community is never stationary; there is always a tendency upwards or downwards, according as the few above or the many below exercise influence; while, independent of the movement of the general body, there are ever some individuals sinking, and, happily, more successfully struggling to rise. But the great mass is yet chaotic; and unless, by God's blessing, breathed upon by the spirit of intelligence, and of order, and of religion, it may be hurled upon all that is fair and good among us, with a momentum as sudden as irresistible." (I. 199.)

CONTENTS.

LETTERS

ON

THE HEALTH OF TOWNS.

Letter I. — INTRODUCTORY.

In the present thriving state of trade and manufactures, there is every probability of a large addition being made to the buildings occupied by the labouring classes in our principal towns, as well as to the number of their occupiers. I therefore beg to call the attention of all parties concerned to the First Report of the Commissioners for inquiring into the State of Large Towns and Populous Districts. According to the evidence therein produced, it appears, that the amount of sickness, and the risk of death, to which the operatives and their children are liable, may be very greatly reduced by paying better attention to the construction of their dwelling houses, especially with reference to proper drainage and sewerage, to the receptacles of filth and their due evacuation, to a free circulation of fresh air, and to an abundant supply of pure water. It appears further, that if these points are provided for beforehand, on principles of science which have been tested by experience, such improved accommodation for the inhabitants of this class of dwellings may be obtained, not only without loss to the proprietors, but rather with great advantage to their property. So that in truth there would be no better speculation for a man of capital, than to build tenements of the lowest class on a large scale and on an improved system, which would be sure to command a preference over such as are ill provided, or wholly unprovided, with the means of cleanliness or healthfulness. And were it otherwise, still the damage done to morals, as well as to health and life, by the neglect of these sanatory precautions, has been shewn to be so large, that it is evidently the interest of the whole community to promote a better order of things with the least possible delay. I hope therefore that my readers will find time to attend to a few details on the points above mentioned, which I propose to lay before them in these letters, taken chiefly from the Health of Towns Commission Report. And in the outset I would urge on those, who have property or influence in any populous place or neighbourhood that they should procure the Report for themselves by early application to the Home Office. It will

convince them, that one of the most pressing duties of the rich is to provide for the improvement of the dwellings of the poor; and it would induce them to take some public measures for responding cordially to the expressed intentions of the Government in this behalf, and for urging their speedy fulfilment. To the owners and projectors of such buildings, I would appeal, not only on the score of humanity, but also on that of pecuniary interest. I would suggest, that the time is at hand when the working classes will refuse to dwell in tenements devoid of water, air, outlet, and drainage; that the Legislature will soon secure for them a better class of dwellings; and that those who now build, without adopting such an improved system, will expose themselves to a needless expense, soon to be incurred in indispensable alterations. But it is to those for whose use such abodes are designed that I would chiefly address my remarks. Whatsoever others may do for you, I would say to them, the improvement of your condition must depend chiefly upon yourselves. The evidence, of which I propose to lay some extracts before you, will shew how much of your health and welfare, and of that of your offspring, depend upon your living in houses well supplied with pure water and fresh air, and which, in point of space and arrangement, are consistent with habits of cleanliness and decency. To these points I strongly recommend you to attach much more importance than you usually do. I am far from questioning the influence of true liberty and good government on your happiness. But compared with the hardship of having to live in the midst of filth, foul air, and pestilent exhalations, I do not think that there is any social or political grievance now existing which you are so deeply interested in removing; or the removal of which would do so much to elevate your condition, to increase your respectability and comfort, and to advance you towards that physical, moral, and religious equality, which is consistent with the due gradations of society, and in which it is my heart's desire to see all my fellow creatures and fellow Christians established. For the redress of these grievances, I would, therefore, have you petition Parliament in your capacity as members of the state. To these improvements, I would have you direct your energies in your own neighbourhood; at your own homes. And I would hope that you will learn to esteem those your friends, who, instead of driving you into a course of fruitless agitation, on highly doubtful questions of politics or political economy, with a view to their own advantage, would teach you to aim at, and help you to secure, each within your own homes, the elements of health and long life, and the almost indispensable prerequisites for the exercise of Christian virtue, and the enjoyment of Christian happiness.

April 29. 1845.

LETTER II. — STATEMENT OF POINTS PROVED.

IN pointing out the causes which materially affect the health of the inhabitants of our populous towns, the chief topics on which I shall have to enlarge are drainage and sewerage, from the first receptacles for every kind of refuse filth, to its final riddance or disposal, together with the supply of water in a state of purity for beverage, and in abundance both for the purposes of cleanliness, and for assisting the operations of sewerage, to which is to be added, as the most essential of all, the free access of fresh pure air. These subjects I propose to divide into the four heads following: 1. Sewerage and drainage; 2. Supply of water; 3. Receptacles of refuse filth; 4. Ventilation: endeavouring to comprise each subject, as far as possible, in a single letter. On each subject I intend to state, first, the evils proved to exist in the generality of our large towns; secondly, the consequences, as shewn in the prevalence of sickness and mortality in proportion to the extent of such existing evils; thirdly, the remedies proposed and practicable; and fourthly, the results of such remedies, in the few cases wherein they have as yet been tried long enough for the results to be ascertained. And it will be seen, as we proceed, that many of these remedies are required and are applicable in the dwellings of the working classes, no less in the country than in the town. As I propose to refer frequently to the documents from which my facts will be taken, I repeat the name of the "First Report of the Commissioners for inquiring into the State of Large Towns and Populous Districts;" to which I have now to add the "Second Report" of the same Commissioners, with Appendix, Part I., dated February 3. 1845, and containing their recommendations of legislative enactments. Appendix, Part II., is promised in a few days. (1) And I would suggest that if these are not already in every public library in our principal towns, they ought to be obtained, by application, without delay. (2)

Before entering into the above particulars, allow me now to state briefly some of the general results, as collected from these valuable Reports. It is proved that the rate of sickness and mortality of the working classes, in our populous towns, is much greater than that of the same classes in the country districts, and much greater than that of those classes in the same towns whose dwellings are better drained and better ventilated. It is proved, that the greater liability of the working classes to the most afflictive and painful disorders does not arise from deficiency

(1) It is now printed. June 20. 1845.

(2) Application ought to be made by letter, stating on whose behalf it is made, and addressed to

The Secretary, Health of Towns Commission, Gwydyr House, Whitehall.

of food and clothing, but from their living, usually with no alternative, in narrow streets, confined courts, damp dwellings, and close chambers, undrained, unventilated, uncleansed. It is proved, that they suffer the most severely in those cases where they spend the day in crowded workshops, or where they live in cellars, or sleep in rooms on the ground floor, or in chambers that have no chimney flue or other vent for the vitiated air. It is proved, that in such situations the average duration of human life is at least twenty years less than it otherwise might be; and that during this curtailed period of existence the working power of those who live is seriously diminished, and much more their capacity for enjoyment, by a constant depression of health and spirits, and by the active attacks of fever, cholera, scrofula, and consumption. It is proved, that this excess of mortality falls most heavily, first on the infantine portion of the community, and next on the heads of families between twenty and thirty years of age. It is proved, that in the metropolis alone from twenty thousand to thirty thousand lives are thus wasted in each single year, with all the attendant misery of sickness and sorrow and want; owing to causes which may be easily obviated or removed. It is proved, that the burden which is thrown by this excess of sickness and mortality on the poor's rates, to say nothing of infirmaries and dispensaries, of friendly societies, and of private almsgiving, is such as to exceed the cost of effecting those improvements, which would suffice to make the average health of the working classes nearly equal to that of the rest of the community. It is proved, that in the mere article of wasted manures, the refuse of a town, if duly collected and carried off, might in most cases be so applied, as to repay the whole cost of sewerage, increasing the produce of the surrounding country, instead of saturating with pernicious moisture the ground on which the dwellings of the poorer classes stand, and defiling the air they breathe with pestilential vapours. And finally it is proved, that besides the waste of money, health, and life, incurred by the system now usually pursued in erecting the lower classes of dwellings in great towns, where comfort, cleanliness, and decency, are either not thought of at all, or are sacrificed to a short sighted greediness of gain, there is also an incalculable amount of demoralization attributable to the same causes; and that, to say the least, an effectual bar is thereby put to the intellectual, moral, and religious improvement of this large portion of the community.

But awful as are the scenes of physical misery, and of moral degradation, brought to light by the reports before us, and painful as is the conviction that these evils prevail so largely in our populous towns, and reach also in some respects even to our most rural hamlets, there is one point of view in which the subject affords no common satisfaction to every one who feels in-

terested in the sufferings of his fellow creatures. It is most abundantly proved, that the evils which have been now laid bare are within the reach of remedy. To a great extent they may be removed in the case of dwellings already built. And they may be entirely obviated in those which shall be constructed henceforth. And these objects may be compassed by an expenditure, which is not only small as compared with the good to be accomplished, but which also may be made to repay itself. This I say is a most cheering circumstance. For if we look at the enormous wealth, concentrated in comparatively few hands, and securing to its possessors the command of this world's goods, and if we next consider how poor in comparison the great multitude of mankind remain, and how often the poor are sickly, and how early they are cut off by death, our hearts might well sink within us, if we could see no way of relief, short of equalising the poor with the wealthy in the sumptuousness of their fare, and clothing, and abodes. But now we know, that neither these, nor yet immunity from labour, are the points which mainly make the difference. The rich man's abundance may expose him to as many diseases, arising from excess or indolence, as those which beset the poor man, owing to hard fare or scanty clothing. Let the labourer but have a decent home, built on a dry soil, well drained, and with all its putrifying refuse properly removed, let his dwelling have at the least two bedrooms above the ground floor, and let it have a good supply of pure water and fresh air; and there is evidence to shew, that he is as likely to enjoy health and length of life, supposing that similar attention is paid to the place in which he does his work, as the most wealthy of his employers. And if he may be thus physically on a par with them, as who would not wish him to be? there remains nothing to hinder him from being so also, as every Christian ought to be one with another, both morally, and religiously.

March 6. 1845.

LETTER III. — THE NATURE OF THE INQUIRY AND OF THE EVIDENCE.

IN my second Letter, I gave a short summary of the points proved, and of the conclusions established, by the labours of the Health of Towns Commission. Many readers will ask, Who are the Commissioners? How did they conduct their inquiries? Is there really good ground for believing conclusions so extraordinary? Can it be true that so great an amount of suffering and sorrow has been going on so long unobserved, and has been suffered to accumulate to such a fearful extent, for lack of pre-

cautions so obvious and practicable? I hope that many will ask these questions. For I would not have any man assent readily to conclusions, however striking, interesting, or naturally welcome, especially if they are to lead to active exertion, without duly considering the reasons on which they rest, and the competency of the parties by whom they are propounded. I proceed therefore to shew the means by which the matters set forth in my last letter have been clearly and abundantly proved.

First, there were selected, by the Ministers of the Queen, thirteen noblemen and gentlemen, distinguished for the humane interest which they were known to feel in this subject; to whom her Majesty committed the duty of inquiring into the matter, and reporting the result of their inquiries. Here we see one of the most valuable uses of good government; here we observe one of the beneficial and honourable occupations, in which men of high rank and scientific attainments are at work gratuitously, often with as much diligence as the best paid of those called working classes, for the good of their fellow creatures. The first Report of these Commissioners, dated June 27. 1844, together with the evidence annexed, fills two volumes 8vo. In this document they state to her Majesty, that they began with examining personally before their Board several competent witnesses, chiefly medical men, with some surveyors of buildings, whose evidence, relating primarily to the metropolis, is afterwards given at length. They also circulated a series of questions, sixty two in number, and transmitted them to the principal public officers in fifty of our largest towns, in which the rate of mortality was known to be the highest. (1) These

(1) QUESTIONS FOR CIRCULATION IN POPULOUS TOWNS AND DISTRICTS.

1. State the position of the town or district, and how it is situated with reference to the surrounding country.

2. What is the geological character of the country? Describe the nature of the surface-soil, and of the subsoil and substrata, and the facilities for, or impediments to, drainage?

3. Is the town or district liable to be flooded; and if so, to what extent?

4. Are there any obstructions to the natural drainage, or to the free flow or escape of the flood-water?

5. Is there any public survey of the town or district comprehending a system of levels from any common datum, for the proper regulation of private or public drainage, for the information of builders, or the regulation of new buildings, or for any other structural arrangements necessary for the protection of the public health and convenience?

6. What are the regulations for draining the town or districts? Are the streets, courts, and alleys laid out with proper inclinations for the discharge of surface-water, or are they uneven and unpaved, and favourable to the retention of stagnant moisture, and accumulations of refuse thrown from the houses? Are there any stagnant pools or open ditches contiguous to the dwellings, or in the vicinity?

7. Are there any arrangements for under-drainage, and are they efficient or defective? Are there any sewers or branch-drains in the streets?

8. Have the houses proper necessaries? Are they so arranged as to

questions, with an abstract of the answers given from each town, to those of the inquiries, which bear most directly on sewerage, drainage, cleansing, and supply of water, form the conclusion of the Report prefixed to the evidence. Each of these

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empty into drains or into cesspools, or in what manner are they cleansed? Are there any public necessaries; and if so, in what state are they kept, and under what regulations?

9. Are the house-drains properly cleansed by water or other means, or does the refuse accumulate in them so that they become choked and emit offensive smells?

10. Are the public sewers so constructed as to act without occasioning deposits or accumulations of decomposing refuse? Are they trapped so as to prevent the escape of offensive smells into the streets or houses, or are there any means used to prevent the formation of, or to remove such accumulations?

11. Are there any logical regulations in force for the systematic drainage of the districts, streets, or houses, or for the amendment of those drains and sewers which are defective, and occasion accumulations of refuse and emit offensive smells?

12. Is a large proportion of the liquid refuse of the town thrown into the water-courses, or is it allowed to soak into the subsoil, or remain stagnant on the surface?

13. What is the sectional form of each description of sewer and branch house-drain, and what is the average cost of each per running foot?

14. How are the public sewers cleansed, and at what annual expense?

15. Is there any, and what service of scavengers for cleansing the streets, and how often and at what expense are these cleansed?

16. Are those courts and alleys which are inaccessible to carts and inhabited by the poorer classes cleansed by appointed scavengers, and how frequently and in what mode is refuse removed from such places, and at what expense?

17. Are the houses provided with dust-bins for the reception of refuse, and how frequently, and in what mode are they cleansed?

18. What places are used for the deposit of the refuse of the town, and to what extent is it sold for productive use as manure?

19. Is there any local authority vested with adequate powers, and duly responsible for their regular and impartial exercise, for the enforcement of cleansing, and the prevention of all public nuisances within the town or district?

20. In respect to the sites of the houses, are they laid out in wide streets, or are they built in narrow courts and alleys? Are any of the houses built back to back; are the courts closed at the end; are there any, and what arrangements for cleansing?

21. Are there any, and what proportion and description of cellar-dwellings; how are they lighted, drained, and ventilated; are they provided with fire-places?

22. Is there any local Act or provision to prevent the ends of streets being closed up, or crossed by new buildings, or to relieve the over-crowding of districts by promoting the regular extension and most advantageous disposition of suburbs, with proper reservation of open spaces?

23. Are the school-rooms for the labouring classes favourably constructed in respect so site, drainage, light, warmth, and ventilation? Are there proper necessaries attached to them? Have they any play-grounds?

24. Are there any open and convenient spaces for exercise, or are there any public parks, gardens, or walks, and in what state are they kept, and under what regulations?

25. Are there any proper open bathing-places or public baths?

fifty towns was afterwards visited and examined by one of the Commissioners in person. They also set on foot special inquiries by other competent parties, in some of the towns in which this seemed desirable; the results of which are given in

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26. From what source is the town supplied with water?
    a. For domestic use?
    b. For watering or cleansing the streets?
    c. For the prevention of fires?

27. What are the qualities of the water supplied, and has there been any analysis of the water in general use? If so, annex it; if not, describe the qualities of the spring or river water, or rain water, and any complaints made, or evils experienced in respect to them?

28. Describe the several modes in use for the distribution of water?

29. Is the distribution by a private individual, by joint stock company, or by public officers?

30. What is the number of houses in the town and suburbs?

31. In how many houses is the water laid on, and have such houses each a separate tank?

32. Are the poorer classes supplied from stand-pipes placed at particular stations, from pumps or draw-wells, or are they in the habit of begging water from tradespeople with whom they deal; or how otherwise do they obtain it?

33. Have there been complaints of the mode in which the water is at present supplied to the population, as to the quantity, quality, or price?

34. What is the present annual charge for water laid on in the several classes of houses?

35. What is the quantity supplied for the different sums?

36. In case of the price being unduly enhanced, or of the supply being deficient in quantity or inferior in quality, are there any means of redress to the private individual, or to the public at large?

37. In respect to any deficiences of supply in quality or quantity, what are the powers deemed requisite to remedy them?

38. Are filters extensively in use in private houses?

39. Is the water kept on constantly night and day, or how often is it kept on?

40. Is there any system of stand-pipes in the town, from which the water may be used for cleansing the pavements and the fronts of the houses?

41. Is it kept on constantly in the mains, so as to be at all times in readiness in all parts of the town in case of fire; is it kept on at high pressure, so that it may be thrown over the highest edifices in such a case?

42. In case of fire, how long is it usually before a full supply of water can be brought to bear on the premises?

43. What are the arrangements in respect to supplies of water for the protection of churches, or public buildings, or warehouses, or large private buildings, against fire?

44. What is the average number of fires in the year, and what are the prevailing causes?

45. Are any houses, or large ranges of buildings, unprotected by party-walls from the extension of fire?

46. Are there any well-appointed and practised engines, and service of firemen for the prevention of the extension of fires?

47. What is the general condition of the town or district with respect to health?

48. What is the state of the worst parts of the town, and especially those where, as appears from the mortuary registers, there is the highest rate of mortality, and where fever and other epidemic diseases are the most prevalent amongst the children or the adults?

detailed reports by the parties so employed. After thus describing the course they have adopted, the Commissioners give the result of their investigations, as to the state of the law bearing on these subjects. They then sum up the answers to their circular questions, and shew, that out of 50 towns, the sewerage and drainage, as far as regards the districts inhabited by the working classes, are not really good in 1, and are decidedly bad in 42; and that the supply of water is good in 6, middling in 13, and bad in 31. They point out the connection of these subjects, remarking, that unless the drainage be good, an increased supply of water would tend to increase the dampness of the dwellings, and to aggravate the causes of disease, by its being left to stagnate in the soil. They state that they have particularly examined the subject, in reference to economy of cost; and they shew that a great saving may be made in various departments, whilst, at the same time, greater advantage is secured. And especially they urge that, by the distribution of the first cost over a term of years, the annual addition to the rent of premises might be reduced to a trifle, which would be below all comparison with their increased value to the occupiers. They advert to the improved means of security from fire, by ample supplies of water, such as to render needless, in many

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49. What is the average duration of illness among the working classes throughout the year?

50. What is the general structure and condition of the dwellings of the poorer classes?

51. What number of families of the poorer classes, on the average, inhabit each house? What number of persons live in one room, and what is the general size of such room?

52. What is the general state of the air in the habitations of the poor? Are any arrangements introduced for ventilation?

53. Are the habitations of the labouring classes comfortably warmed in winter? What is the form and construction of the fire-place, and what is the nature of the fuel in common use?

54. Is gas-light generally introduced in the shops or dwelling-houses, and is any escape provided for the bad air which it produces?

55. What is the state of the lodging-houses for the poorer classes, and are there any police or other regulations with regard to them?

56. What proportion of the losses of rent and rates from the poorer descriptions of tenements are caused by interruption in the employment of the inmates, and expenses occasioned by sickness and mortality?

57. What is the extent of parochial or charitable relief given in aid of sickness in the districts where the average duration of life is the lowest?

58. To what extent is medical advice or assistance sought for by the poorer classes, and how far is it afforded to them gratuitously or otherwise?

59. Are there any hospitals or dispensaries in the town or district? What regulations are they under? What is the average number of patients?

60. To what extent and in what manner are the public buildings ventilated?

61. Are there any common lands belonging to the town, and of what extent and description?

62. Are there any powers under local Acts for enforcing regulations upon any of the above subjects? If so, furnish a copy.

cases, the expense of fire insurances. They point out the profitable application of the refuse filth of towns. They treat of the means of preventing the overcrowding of tenements, and of obtaining due ventilation. They suggest the importance of a general system of correct levels of the sites of houses, which should be accessible to all parties interested. They touch also upon the evils arising from unhealthy manufactories; from the interment of the dead in the midst of the abodes of the living; and from the crowded state of the common lodging houses for travellers. And they particularly insist upon the facility with which most of the evils thus adverted to may be obviated for the future, as compared with the difficulty, happily not insuperable, of remedying them where they already exist. Such is the substance of the First Report (2); a document addressed to the Sovereign, authenticated by the signatures of men notable for rank, and talent, and humanity; and directing the attention of the public to grievances not speculative but real; to gain, not of gold and silver for the few, but of health and life for the many; and to glory, not of battles by sea or land, but of victory over sickness and misery, over filth and profligacy, and of the triumph of true science in the cause of humanity.

Such is the substance of the First Report, which, including the questions to the fifty towns, and the abstract of replies, takes up the first 48 pages of Vol. I. The evidence follows in detail, with the names of the witnesses; whose characters thus stand pledged to their statements. That which bears upon the causes of disease and the varying intensity of its operation, is comprised in the first volume. The evidence contained in the second volume relates first to the supply of water, down to the end of p. 154; thence is on the sewers of the metropolis, to p. 264; thence on drainage of buildings, improvements in the structural arrangements, the charges consequent thereon, and the means of lightening the burden of them, to p. 369; thence on the cleansing of houses, the removal of refuse from streets, and its profitable application, to p. 432; thence on the im-

(2) The date of the Report is June 27. 1844. And the names of the Commissioners are as follow: —

BUCCLEUCH.
LINCOLN.
ROBT. A. SLANEY.
GEORGE GRAHAM.
H. T. DE LA BECHE.
LYON PLAYFAIR.
D. B. REID.
RICHD. OWEN.
W. DENISON, R. E.
J. R. MARTIN.
JAMES SMITH.
ROBT. STEPHENSON.
W. CUBITT.

portance of general plans and surveys of towns, for the purposes of streets, buildings, sewerage and drainage, gas pipes and water pipes, &c. to p. 487. The two volumes are illustrated by several plates. The Second Report, dated Feb. 3. 1845, but lately come out, and not yet printed in 8vo. appears in the usual form of parliamentary papers. In this document the Commissioners first sum up the results of the evidence previously collected. They next state some of those which have arisen from their subsequent inquiries. After which they proceed to lay before her Majesty a summary of the measures which they recommend by way of remedy. These embrace new laws, and new powers to be given to officers of the Crown, and to local authorities, for superintending the execution of these laws; laws to relate to drainage, paving, cleansing, supply of water, width of streets, construction of buildings, regulation of lodging houses, and abatement of nuisances. Thirty distinct recommendations on these points are then set forth, with the reasons on which they rest; reaching from p. 13 to p. 68. They are too long for insertion in a letter. But they demand the immediate attention of all parties interested in building houses in towns. How much more do they deserve the careful and thoughtful consideration of those who are to dwell in these houses, whose life, health, and comfort, are here being provided for! This second Report, like the first, has the signatures of the Commissioners, and is followed by Minutes of Evidence taken before the Board, and a list of the towns severally visited by the Commissioners in person, and various important Tables, and Abstracts of Returns, &c. bearing on population, mortality, laws and local regulations, down to p. 118. Then follows the Appendix, Part I; containing the Reports drawn up by the Commissioners themselves, on the towns which they personally inspected, filling 159 pages. ([3])

I have thus endeavoured to give my readers some idea of the pains which have been taken to ascertain the truth; and I trust that this will tend to satisfy them, that the conclusions stated in my last letter are no other than strictly true. I propose next to enter upon the details of the evidence; of which I

([3]) The second part of this Appendix, now printed in folio, contains detailed Reports on the sanatory condition of large towns in Lancashire, by Dr. L. Playfair; of the northern coal mine district, by Dr. D. B. Reid; of Lancaster, by Richard Owen, Esq.; and Woolwich and Salisbury, by Captain Denison; of Nottingham and other towns, by J. R. Martin, Esq., of York; and other towns, by James Smith, Esq.; of Exeter, by Thomas Shapter, Esq.; with some General Observations and various Replies to Questions; occupying 380 pages, illustrated with several maps and coloured plates, and particularly by a series of twenty four drawings, exhibiting the whole process of ventilation, as explained in Dr. Reid's Report. Separate portions of this volume are already printed in 8vo., and may be obtained by application, as above, p. 3., to the Secretary of the Commission.

can of course offer only a few of the most striking points, and no selection from which can convey an adequate impression of the effect produced by the perusal of the whole. Meanwhile allow me to express the hope, that a subject, so deeply interesting in reality to all, must have begun to excite a lively interest in many. And let me inform those who would assist in promoting the good work in hand, that there are already three associations formed, and at work, to which they may contribute funds for general use, or from which they may receive valuable counsel, if they have property of their own to operate upon, and are disposed to improve the dwellings of their tenants: 1. Society for the Improvement of the Condition of the Labouring Classes, John Wood, Esq., secretary, Exeter Hall, Strand, London: 2. Health of Towns Association, H. Austin, Esq., secretary, 10. Walbrook, London: 3. The Metropolitan Association for improving the dwellings of the industrious classes, C. Gatliffe, Esq., secretary, 19. Coleman-street, London. Applications by post for prospectuses will be gladly attended to; and the answers will prove how much of energy and benevolence is already at work, and will I trust induce many persons to go and do likewise.

March 13. 1845.

Letter IV.—DRAINAGE AND SEWERAGE.

In providing for the drainage of a house or town, the first object is to get rid of any water which may be naturally retained in the soil; for we may sometimes have to build on swampy ground. But if the soil be naturally dry, which is a point of great importance in the choice of a healthy site, the next object is to dispose of the rain as it falls from the clouds. For just as by holding up an umbrella, though we keep our clothes dry, we do but throw off the water to the ground in a circle all around us, so in putting a roof over a house, whilst we prevent the rain from reaching the space so covered in, we cause it to drip down in an accumulated quantity on the walls and at the foot of them, flooding the space between one house and another. Now if we suppose a town with the houses well roofed, and supplied with spouting, and all the remaining space well paved, the whole of the rain that falls will have to be carried off by gutters, and drains, and sewers. Supposing roofs, but no pavement, and no drainage, the rain water would all settle into the soil, sapping the foundations of the walls, rendering the floors damp, and filling the air with vapour. This gives one some idea of how far it is wise to build a single house, or so much as a shed or pigstye, without providing by spouts and

drains for getting rid of the water which is intercepted by the roof. Yet how many of our country churches are exactly in this state; the rain, as it is warded off from the heads of the living, being brought to drip with all its force into the surrounding graves of the dead! Roofs then and pavements, in well ordered buildings and towns, form the first conduits towards drains and sewers. And where the action of each part of the system is duly adjusted, the air of a city becomes more free from damp, and in this respect more healthy, than the atmosphere of most parts of the country.

But besides the moisture which falls upon us from the clouds, we are daily bringing into our streets and our abodes both water from springs, and wells, and rivers, and also various other matters, liquid and solid, for food and for many other uses; of which matters, a very large amount, and ultimately the whole, or nearly so, becomes refuse, and must somehow be got rid of. Now a perfect system of sewers is adapted for the disposal of all such refuse matters, whether liquid or solid; the one helping to float away the other, and the rain as it falls washing all out clean. And such a system, to be perfect, must clear off every kind of refuse out of the precincts of the house and of the town, before it has begun to decompose and putrify; and then the town atmosphere would not only be as dry as that of the country, but as free from every thing that is offensive and injurious, as far at least as this refuse matter is concerned. But if there be no efficient public sewers, if the refuse be merely put out of sight in cesspools and dust bins, or in sewers, which, for want of a proper fall, are full of stagnant filth, and act as extended cesspools; if there be no drains from each house into the public sewers, and no traps or valves, or flaps, at each opening of sewer and of drain; if there be no good pavement, nor any well formed roadway impervious to moisture; in such a case, and in proportion as these several points have in any case been neglected, there, not only the rain, but all the water used for washing, cooking, and manufacturing, however filthy it may have become, and all the refuse and excremental matter of every kind, accumulating hour by hour, and day by day, and year by year, except so far as it may be partially removed by the offensive and degrading process of manual labour, must be left to rot on the surface, and to sink into the soil, liable to be stirred up anew by each shower that falls, and ready to yield to the sun as it shines, and to the wind as it blows, vapour charged and tainted with disease and death.

Let us now learn from competent witnesses what is the state of our metropolis and principal towns, and especially of the districts most densely occupied by the poorer classes, in respect to points of such great influence on health and life. We find that out of fifty towns the drainage is not good in one, and is

"decidedly bad" in forty two. (First Report, Vol. I. page xv.) We find that in the metropolis "as a general rule, while the best class of streets are cleansed, by scavengers, once a week, the second class are cleansed only once a fortnight, the third class only once a month, and the worst class never; though of course the worst, for the very reason that they are the worst, ought to be cleansed daily." (I. 30.) In the same page we read of a "long narrow street, in the centre of which is an open sunk gutter, in which filth of every kind is allowed to accumulate and putrify. * * * The street is wholly without drainage of any kind. Fever constantly breaks out in it." This, it appears afterwards, is a common case. (See II. 118—122.) A whole district similarly circumstanced is described in I. 31, with this remark added: "Particular houses were pointed out to me, from which entire families have been swept away; and from several of the streets fever is never absent." We find a very striking account, at page 118, of a fever continually breaking out in the General Lying in Hospital, clearly traced to the influence of above 1,500 yards of open ditches full of stagnant filth in the neighbourhood, and to the blocking up of the main drain of the premises, whereby "the whole basement was flooded with every description of decomposing impurities." On the removal of these nuisances, together with the introduction of a new method of ventilation, the fever disappeared . . "From that moment we have not had a case of puerperal fever. Patients have been admitted broken down by poverty and misery. Severe and dangerous labours have occurred among them. And there has been every possible variety of weather. But up to the present time since July there has not occurred the slightest trace of puerperal fever." (I. 120.) We are taught afterwards how little can be done by ventilation when the air admitted from without is vitiated, by the comparison of two rural villages in Yorkshire, within a short distance, one situated on an eminence, the other in a slight hollow, and badly drained, with a "wide stagnant ditch passing through the village." In the latter the deaths by epidemic disease are more than thrice as many as in the former, in proportion to the number of inhabitants; and the scarlet fever "was so malignant as to be fatal in a few hours." (I. 234.) As to the sewers in the metropolis, besides the many streets in which there are none, they appear to have been ill constructed in most instances, usually acting as so many stagnant cesspools, with a multitude of untrapped openings which emit most pestilential vapours, and often carry the seeds of malignant fever into the best ventilated squares and streets. (I. 22. 121; II. 215. 241. 252.) As to the larger towns, we find that Liverpool, which has one of the best natural sites, is the most unhealthy in all England, judging by the proportion of deaths to the number of inhabitants. (I. 124. 271.)

And we read of there being in it "thousands of houses and hundreds of courts without a single drain of any description;" (I. 272;) an evil greatly aggravated in this particular town by the circumstance, that so many families live and sleep in underground cellars. In Nottingham we find one of the rivers most essential to the drainage of the town arched over on a contracted scale, and built upon, also stagnant pools in the most populous districts, very many streets and blocks of buildings without any sewers at all, and the openings, or "inlet shoots," into the existing sewers, "which are very numerous," frequently emitting "most noisome stenches." (I. 314, 315. 317.) We find that much injury is done to the drainage and health of towns "by mills which tail up the streams on which they are situate." (II. 422.) And at Leeds, we read of "a succession of dams for mill power and navigation purposes, which form a series of catch pits for the manure of its 120,000 inhabitants." (II. 436.) We find an intelligent physician giving it as his opinion, and proving it by a very remarkable Table of Mortality (1), that the true cause of the periodical cholera, so generally ascribed to the abundance of fruit, is to be found in "the miasmata evolved from stagnant water, or impure drains, by the heat of summer." (I. 262.) By another Table it is shewn that the districts in Leicester being divided into three classes; 1. culverted; 2. partly culverted; 3. not culverted; the proportion of persons dying of epidemic diseases are in the first only one twelfth, and in the second only one eighth, of those who so die in the third. (I. 269.)

But I have no more space to enter upon the details of the evidence. Probably this small sample will suffice to impress on those who occupy houses in towns, how much it concerns them, in selecting their abodes, to look to the drainage and sewerage of the neighbourhood. On the means of improvement, and of obviating future mischief, in the construction of drains and sewers, I have something to say to builders in a future letter. For the present I would conclude with pointing out to the more influential classes, to the Magistracy, to the Clergy, to the Landowners, and to the Master Manufacturers, the following remarks of a benevolent physician, whose evidence stands first in these volumes: "I know that no verbal description of these places can convey any conception of their disgusting and poisonous condition. They must be seen to be at all understood. And when seen, every one involuntarily exclaims, 'Can such a state of things exist in a country that has made any progress in civilisation?'" (I. 31.)

March 20. 1845.

(1) See Tables in the Appendix II.

LETTER V. — SUPPLY OF WATER.

MOST men regard a good supply of pure water as one of the first points to be considered in choosing the site of a house. The site of a town may have been necessarily determined without reference to this point; or the site of a town may have outgrown a supply of water ample for its original inhabitants; but in such cases the demands of a large town population will pay the cost of fetching supplies from a distance, by aqueducts, canals, or pipes. In this respect indeed, as in many others, the inhabitants of large towns are in a position to derive no slight advantage from the contribution of many to a common object; and were it not for mismanagement, they might usually enjoy the use of water at less cost of money and of time, than those who dwell in lone houses in the country. How then stand the facts in evidence? Out of fifty of our larger towns, the supply of water is reported good in only six, middling in thirteen, and decidedly bad in thirty one. (See Vol. I. xviii.) Of the metropolis, by way of specimen, we read: "In Bethnal Green there are whole streets in which there is not a single house with water laid on the premises. In some parts of this district, for the use of the houses of several streets * * * there are but two pumps. In one crowded part of this district, I found the poor inhabitants deprived of water altogether, because the owner of the houses had had some quarrel with the water company, and the water company had wholly stopped the supply of water." (I. 30.) "I wish to add my testimony," says another witness, "to that of every practical man who is acquainted with the poorer class of habitations, that a greater blessing could scarcely be conferred by Government upon the working classes of London, or one more essential to health and comfort, than that of a cheap and abundant supply of water; and that the present mode of supply is about the most expensive and inefficient that can be devised." (II. 237.) In London the quality of the water supplied is for the most part bad, besides its deficiency in respect of quantity. For a sample we may take the district supplied from the river Thames, into which river, moved to and fro by the tide, all the sewerage of the metropolis is discharged. Hence, a witness being asked his opinion as to turning all the filth of the houses into the sewers, instead of detaining part of it in cesspools, shrewdly replies: "It might be done; but then arises a question, as far as the public health is concerned, when we all have to drink the Thames water." (II. 382.) As to the wasteful expense incurred by conferring monopolies on water companies, it is shewn, that in Liverpool the public are paying six times the cost incurred by the company. (I. 278.) And as to the supply thus exorbitantly paid for, "In the poorer neighbour-

hoods there is usually a cock in each court, and the inhabitants carry it and store it in jugs or wooden vessels, from day to day. But compared with the dense population the supply is totally inadequate; as the turncocks of the company cannot allow it to run a sufficient length of time; and many of the habitations of the poor, whether from this circumstance, or from inherent habits of filth, I do not venture to say, have never had their boarded floors properly scoured since the houses were erected." (I. 279.) Many inconveniences arise from this plan of turning on the water for short periods, and shutting it off from use for long intervals. Even when each house has its own tank or water butt, there is considerable expense needlessly incurred in providing these receptacles, and repairing and replacing them. They are much exposed to accumulations of soot and dust. (II. 25.) They take up space which can ill be spared, and cause a damp evaporation close to each house, independently of leakage. (II. 30.) And no small waste is apt to arise, both by the accidental derangement of ball and stop cock, and from water running, when turned on, out of casks left open whilst it was turned off. (II. 46. 338.) Upon the whole, it appears that, in the metropolis, and in most of our great towns, the water supplied is impure in quality, or deficient in quantity, or both; and, moreover, is usually most inefficiently distributed, on the the intermittent system, instead of being brought ready to hand, as it easily might be, to every floor of every house, at every hour of day and night continually.

It needs no evidence to prove that this state of things must be detrimental to health, and therefore also to enjoyment and length of life. In personal cleanliness, in washing of apparel and of linen, in cleansing of floors and furniture, in preparing and cooking food, besides the important element which water forms in every one's diet, it is obvious that when this article is scarce, or foul, and much more when it is both, the human frame must thereby suffer more or less, daily and hourly; or rather, we may say, that in such a state of things, not a moment passes in which man, woman, and child, are not under some influence injurious to health, which might be easily abated or wholly avoided. Let a single witness suffice; a witness who mentions several striking facts, and states as the result, his "strong conviction, that the quality of the supplies of water, and the mode in which it is received and kept in such atmospheres, influences the diet and health of the population to a much more serious extent than has hitherto been imagined." (I. 82.) To this must be added the risk of life, as well as of property, by fire, which in a town is much greater than in lone houses; each man's safety depending in some measure on the prudence of his next door neighbour, and the common security depending chiefly on an ample and constant supply of water. It is in

evidence, that since the commencement of the present century, in the single town of Liverpool, property to the value of more than two millions of pounds has been destroyed by fire; and that in a town which pays so dearly for its water, there has on these occasions seldom been a supply to be had, until the fire had made considerable progress. (I. 278, 279.) It is not mentioned how many lives were lost in these fires, how many limbs mangled, how many human beings maimed for life, thrown out of work for a length of time, or added to the sorrowful company of widows and orphans. Within this week we have heard of another destructive fire in Liverpool. Macclesfield too has lately had a narrow escape; a fire having burst out, happily in the day time, when there were several men at hand to supply water at once, on the premises of a tradesman in the market place, whose cellar, where the flames were lighted, was stored with oil in casks, whilst his attic story contained a magazine of gunpowder. In which position of affairs a careless workman 'threw the burning snuff of a candle amongst some saw dust strewed on the floor, and saturated with oil.' And within four doors was another stock of gunpowder! Such are the neighbours one may have in a town residence! And yet even risks like these may be amply balanced by the security from fire, attainable under the system of supplying water now to be explained.

The first point is a judicious selection of the sources of supply, both as to quantity and quality. Where the streams brought into the town from a distance are rendered turbid by land floods, or by other unavoidable causes, the water may be purified by "settling reservoirs," as at the East London Waterworks; (II. 24;) and still further by "filters," as at Nottingham and Southwark, and by "self-cleansing filters," as at Greenock, Paisley, and Ayr. (II. 3. 52. 129.) Quality may therefore always be secured. The other important point, quantity, implies both that enough is brought into the whole town, and that enough reaches each single family. And it is most gratifying to find proof, in the experience of Nottingham, Preston, and Greenock, as well as of Philadelphia and New York in the United States, that the method of supply which is in effect the most unlimited is at the same time by far the least expensive. (II. 1. 29. 136. 147.) This method consists in forming the head of water, or forcing it by mechanical power, up to a certain height above the highest point to be supplied in the whole town; and thence distributing it by a series of pipes, gradually decreasing in size, as they branch out in every direction, until they reach every street and court, and house, and floor; which pipes are kept always full, always in free communication with the head. "It may be said that the effect of this arrangement is, to substitute one large reservoir or tank, well situated and

under effectual care, for the many thousand ill placed butts and tanks requisite to afford a copious supply on the former arrangement." (II. p. 30.) Upon this plan it appears that pipes of smaller dimensions suffice for a larger supply, the stream being in constant progress; (II. 146;) that the pipes, for the same reason, are not liable to be strained or burst by a sudden gush of water, or by condensation of confined air; (p. 147;) that waste is prevented by the noise which ensues on a cock or flow being left open; (p. 147;) that such pipes as are made of lead cannot be cut without great difficulty, and risk of immediate detection; (p. 148;) that the cost of supply in each point of detail is very much diminished; (p. 33;) and that, according to the opinion of one of the most experienced engineers, it may even be reduced to one sixth part of the cost [1] of the common method. (p. 151.) Add to this, that the pipes, thus always full of water, are not liable, as on the system of intermittent supply, to the introduction of gas from flaws in the adjacent gas pipes. [2] (II. 108.) Add that they are less liable to be damaged by frost, when the water, itself above the freezing point, is always passing through them, than when they are cooled down by the introduction of air, ready to chill the water when next admitted. And finally add that the protection from risk of fire, hereby afforded, may be made fully equivalent to having a fire engine always charged and ready to act, in every street, and house, and floor. Thus in Preston we find that water can be thrown over the highest buildings, by means of a hose screwed to a plug in the street; and that several warehouses are fitted up at a trifling cost with plugs on each floor; and that in some cases of fire which have occurred, the success of this method has been so complete, as to render it probable, that the heavy expense of insurance may be safely dispensed with. (II. 148.) And in Philadelphia, which is in some degree protected from the spread of fire on this principle, "insurance risks are taken at one half the premium chargeable in Boston and and Baltimore." (II. 139.) But to conclude with testimony nearer home, and on the points with which these letters are chiefly concerned; let us mark the following particulars in the evidence of Mr. Ashton, of Hyde, near Manchester, owner of "about 320 labourers' houses." Before the water was laid on, "the labour and annoyance of fetching water was excessive." * * * "The wells were the continual source of demoralisation." — "Has the change of practice given satisfaction to your tenants? I know no alteration that has given so much." — "Have you observed the

(1) Hence it would appear that the inhabitants of Liverpool, who, as previously shown, pay six times what their water actually costs the water companies, are in reality paying thirty-six times as much as would suffice to procure a much better supply.

(2) See Plans in Appendix I.

effects on their domestic habits? Their houses are much cleaner, especially their back yards." * * * "There is no stint in the use of water." * * * "Their condition has certainly been raised by an increased supply of water." — "You consider that their health has decidedly improved? Certainly." (II. 99, 100.)

March 27. 1845.

Letter VI. — RIDDANCE OF REFUSE.

If any one were to watch at the entrance of a large town, and to calculate how many market carts in a day come in full and go out empty, how many thousands in the course of a year, millions in a century, he might well wonder what becomes of their contents. The result brought to light by the inquiries before us is this: That a great part of the refuse, in its most obnoxious state, is suffered to putrify on the surface, and to sink into the soil; defiling it to a considerable depth, poisoning the springs, tainting the atmosphere, and shortening the lives of the inhabitants.(1) This is a part of our subject, which, in all its details, presents more than common difficulty, both as to the best remedy for the evil to be cured, and as to the language in which best to treat of it. But in a matter which so largely concerns the life, the morals, and the happiness, of millions, it will be the most excusable to err on the side of plainness of speech. For that must be a false delicacy, which would silence the pleadings of humanity in behalf of health and decency. And accordingly we find that the Commissioners have not reckoned the details of this matter, however low and loathsome, either beneath their notice, or unfit to be mentioned in plain terms, when needful, in a state document addressed to her Majesty the Queen. (I. xiv. xxviii.) And we also find the same subject adverted to in a work of far higher authority; (see Deut. xxiii. 12 . . 14;) in that law which was graciously revealed from Heaven for the direction of a chosen

(1) It is well known that the inhabitants of Bilston, a populous town in the Mining District of South Staffordshire, suffered more severely by the Cholera in 1832 than those of any other place in England; according to the following statistics:—

Population, 14·492. Cases of Cholera, 3·568. Deaths by Cholera, 742. First case reported, Aug. 4. 1832. Last case, Sept. 21. 1832. The writer of these letters lived at the time in an adjoining parish which also suffered severely, though far less so. And he can testify that at the period of the visitation there was no such thing as a sewer or covered drain even along the principal street of Bilston. The town was also singularly ill supplied with water; most of the springs being drained by the mines underneath. And both in regard to the construction of the buildings, and the crowding of their inhabitants, it presented the most marked violation of every principle of healthfulness set forth in the Report before us.

people in all particulars of civil and domestic life; a law, of which the letter is indeed no longer binding on any portion of mankind, but the principles of which are dictates of divine wisdom, truth, and goodness, still conducive, whereinsoever they are still applicable, to the welfare of all men everywhere. And moreover the more offensive and disgusting is the actual state of things now to be described, so much the more urgent is the duty of trying to amend it; so much the more imperative is the unwelcome task of that public exposure, without which it is little likely ever to be amended.

To proceed then with a few specimens of the painful evidence on this point, annexed to the first Report. The state of things in a populous part of the metropolis is thus described: "Great numbers of the houses are without privies." "Punderson's Gardens," in which a few of these out buildings are common to several houses, "is a long narrow street, in the centre of which is an open sunk gutter, in which filth of every kind is allowed to accumulate and putrefy. A mud bank on each side commonly keeps the contents of this gutter in their situation; but sometimes, and especially in wet weather, the gutter overflows; when its contents are poured into the neighbouring houses, and the street is rendered nearly impassable. The [common] privies are close upon the footpath of the street, being separated from it only by a paling of wood. The street is wholly without drainage of any kind." (I. 30, 31.) "During the last thirteen weeks of the St. Giles' contract we were paid *5s.* a-week for keeping the inhabitants in Lascelles Court, Holborn, decent; preventing them making use of a small place which had seemed to have been originally an old watch box; and a place of filth it was. We used to send a barrow in at four o'clock in the morning and take it away." "So that they had no convenience at all?" "No." (II. 371.) Enough of London, our centre of civilisation. Next of Liverpool: "The whole cellar population of the parish, upwards of 20,000, are absolutely without any place of deposit for their refuse matter. Of the front houses inhabited by the working classes a large proportion are in a similar predicament." * * * "I am enabled to state that in 26 streets of the description referred to, * * * containing about 1,200 front houses, not less than 804, or two thirds, were without either yard, privy, or ashpit." A description of the consequences ensuing from this state of things is thus concluded: "Were there means of carrying off even the fluid portion of this superfluity of filth, the mischief would be lessened, as the noxious ingredients would less readily mingle with the air; but no such facility exists; for I do not know of a single court in Liverpool which communicates with the street or sewer by a covered drain. The fluid contents therefore of the overcharged ashpits too frequently find their way through the mouldering

walls which confine them, and spread a layer of abomination over the entire surface of the court. In some instances it even oozes through into the neighbouring cellars, filling them with its pestilential vapours, and rendering it necessary to dig wells to receive it, in order to prevent the inhabitants from being inundated. One of these wells, four feet deep, filled with this stinking fluid, was found in one cellar under the bed where the family slept. (I. 128, 129. See also for Liverpool, I. 155, 156. 274.) At Manchester, in the district of Chorlton-upon-Medlock, in the midst of an account of the filth and indecency arising from the lack of a proper place attached to each house, we read as follows: "I have known instances where the wall of a dwelling house has been constantly wet with fœtid fluid, which has filtered through from a midden, and poisoned the air with its intolerable stench; and the family was never free from sickness during the six months they endured the nuisance. Instances in which fœtid air finds its way into the next dwelling house are not unfrequent." (I. 211.) In parts of York, we read, "the soil holes are usually open; and run over, and flood back courts;" with much more to the same effect. (I. 222.) A similar state of things prevails at Leeds. (II. 437.) At Nottingham, out of its 11,000 houses, about 8,000 have no private receptacles. And at the end of a most revolting account of those which are common to several wretched dwellings, it is justly remarked by the intelligent witness: "These mal arrangements militate most grossly against the comfort, decency, morality, and health of the labouring population of the town." (I. 316.) This remark, with which I conclude these disgusting details, is my ample apology for introducing them. If these things are really thus, if they are thus in thousands of instances, if they are thus, more or less, in all our great towns, and, to some degree, in our country districts also, and if no less than the health, comfort, decency, and morality of millions of our fellow creatures is at stake; the evil must be probed without flinching, in order that the remedy may be applied without failing.

The first point to be attended to in the remedy is, that every individual house, abode, and home, should have its own receptacle attached to it, private to itself. Without this point secured, there is no hope of decency or cleanliness. The next great principle is the universal use of water, for the purpose of removing every kind of refuse from the precincts of town dwellings, and also as a means of cutting off communication with the effluvia thence arising. (2) The mere lack of a proper sink, in a

(2) "The principal gas given out from these deposits is sulphuretted hydrogen, the most deadly of the gaseous poisons, two or three cubic inches causing instant death when injected into a vein, or into the chest, or beneath the skin of animals. A rabbit died in ten minutes after being enclosed in a

town dwelling, leads to much more accumulation of dirt and damp than would be generally supposed. (See I. 83.) The presence of a tap well supplied with water, having a sink immediately beneath it, yields an incalculable amount of comfort to a family in a town. (See II. 99.) The same principle must be applied to all refuse, and especially to that which is the most offensive of all. If required generally, and on a large scale, it might be applied much more cheaply, and no less effectually, than it is now commonly applied to the better class of houses. Proofs of this, and detailed estimates of the expense, may be seen in the Report. (I. 306; II. 75.) This plan is applicable to streets, courts, and blocks of houses already built, which in many cases are so constructed, that no detached outhouses could possibly be added. In such cases it is the only plan. In all cases, in a town, it is the best and the cheapest plan, combined with a due supply of water, and with proper drains and sewers. But the drains and sewers must be so much the better constructed, in proportion to to the amount of refuse they have to carry off. ([3]) Care must

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bag containing sulphuretted hydrogen, although its head was left free so as to allow it to breathe the pure atmosphere. Nine quarts injected into the intestines of a horse, as a common clyster, killed it in a minute; and I have heard it stated that it is difficult to keep horses in high condition in the immediate neighbourhood of large privies, where sulphuretted hydrogen is abundantly given out. Even when largely diluted with atmospheric air, it retains, in a great degree, its noxious properties. A dog was killed by being made to breathe a mixture of 1 part of this gas with 800 parts of common air; and air containing only 1-1500th part of sulphuretted hydrogen proves speedily fatal to small birds. If the principal ingredient of these emanations is capable of exerting such destructive agency, we should expect it to have shewn its effects occasionally on the men employed in clearing out the places where it accumulates. Various instances of this kind are on record, in some of which immediate death followed the incautious inhalation of the effluvia in a concentrated form; and in others, where the gases were more diluted, the persons breathing them became faint, delirious, and insensible, or were attacked with convulsions, even where they ultimately recovered. The most remarkable examples of this kind have occurred in France, where the contents of the *Fosses d'aisance* are allowed to accumulate for a long period; but it is not a great many years since four men fell victims to the poison while engaged in clearing out a privy near Brompton; and still more recently an accident of a similar nature happened at Clapham. Twenty three children, belonging to a boarding school at that place, were simultaneously attacked with violent irritation of the stomach and bowels, convulsive twitchings of the muscles, and excessive prostration of strength; and two of them died in about twenty four hours. The symptoms were ascribed, by the medical attendants, to the inhalation of sulphuretted hydrogen from the contents of a foul cesspit, which had been scattered over a garden adjoining the children's play ground. Although these effluvia are breathed by the inhabitants of our courts and back streets in a state, of course, of extreme dilution, we cannot suppose that they are on that account entirely harmless. What, in a concentrated form, is so very deadly, must, in a diluted state, be injurious to health." (I. 139.)

([3]) The existence of the Cloaca Maxima at Rome, supposed to be coeval,

be taken that they be real active conduits, not merely extended stagnant cesspools. (I. 21.) They must be properly trapped, and supplied with valves and flaps. (II. 249.) They ought to be adapted to the system of flushing (4), not only by the use of rain water, properly husbanded, (II. 246,) but also by the impulse of their own fluid contents, according to a plan recently adopted with success in some of the London districts. (II. 160. 246.) As to materials and form, ingenious adaptations of the common brick to a form of drain with angular bottom may be seen; (Vol. II. 284. 286, 287;) and at p. 289 is a good plan for a cheap drain with semicircular bottom. But the best form is the section of an egg, oval, arched at the top and sides, and with the lower portion of the curve the most contracted. Radiating bricks are much better than the common sort, saving in cement or mortar what they cost in form; and not liable to the serious objection which attaches to drains made with ordinary bricks, that the width of the joints increases as the bottom of the drain wears out, whereby strength is diminished and leakage is incurred. But tile tubing is on many accounts the best of all; and seems likely to prove applicable to the largest sewers that will usually be required. It displaces less earth, affords less harbour for rats, presents less obstacles to the uniform passage of fluids, and even promises to supersede the flushing altogether. (II. 259, 260. 283. 366. 368.) Useful remarks on the juncture of different lines of piping, which whether for supply of water or for drainage ought never to be at right angles, but always on a curve, occur at II. 103. 468. The best methods of access to main sewers, for such purposes as inspection and repair, as well as gulley holes, are shewn at II. 164. 255. And the prevention of such malaria as may possibly arise even from the best constructed sewers is provided for by a plan mentioned at II. 250.

And now let us sum up briefly the results which might thus be approached in all cases, and completely attained in many. The whole excremental matter of a town, animal and vegetable, including the refuse of manufactories, aided by the rain, would be in constant progress of removal, from the moment of its being first deposited, in impermeable pipes, cut off from all communication with the atmosphere, by valves, flaps, and fresh water interposed. What would be the effect on the health of a dense

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or nearly so, with the foundation of the city, is a striking proof of the importance attached to this subject, by a great people, more than 2000 years ago.

(4) "In respect to Eton, I would mention that the College is provided with sewers constructed at the time of the foundations being formed, and the person who laid them out 400 years ago provided reservoirs and sluices for the purposes of flushing them with water; and those sewers have been kept free from deposit by periodical flushings ever since.' (II. 168.)

population has unhappily not yet been proved by experience; it may however be surmised from these two facts, first, that there are districts in the country, where the mere drainage of water has reduced the fogs to one tenth of what they used to be within the memory of men now living; (see II. 417;) and secondly, that on a comparison of houses and districts, in which these points have been neglected or attended to, there are cases in which the rate of sickness and mortality is more than twice as great in one as in the other. (See I. 206.) There is moreover another result of incalculable importance, by no means to be passed over without mention. The refuse thus prevented from polluting our towns may be made a source of unlimited fertility to the country. Being completely collected and removed, before its decomposition has commenced, it is wholly applicable to the multiplying of the products of the soil, in proportion to the multiplying numbers of those who dwell in the land. Plans for the accomplishment of this great national object are suggested at Vol. I. 214, 215, 216; II. 176. 427. 429. The large increase of produce, and of the value of land, which has actually been effected by these means, is shewn at Ashburton, (II. 407,) at Edinburgh, (II. 440,) and at Milan. (II. 406.) And when we find that produce may be thus increased fivefold, and that the fertilising matter thus saved is applicable to arable as well as to pasture land, when we consider further what dense multitudes are enabled to enjoy plenty and health, both in Holland and in China, by means of the economy of waste manures, we shall be astonished to think of our own folly, in fetching guano from Africa and America, and letting our own lie to rot, and run to waste, and turn to pestilence, in the midst of our habitations; in expatriating our people to dwell in the ends of the earth, for lack of food, which we have the means of increasing indefinitely in our own country (5); and above all, in presuming to suppose, with the disciples of mistaken Malthus, that our Maker has not adequately provided for the wants of those, whom He has commanded to increase and multiply, when He has so constituted the animal and vegetable world, that by the agency of a natural alchemy, the refuse of the one is capable, with due care on our part, of being constantly made the means of fertilising and fructifying the other, for its own perpetual renewal, and for the supply of food for man, perpetually increased in quantity, and renewed in pure, wholesome, and nutritious quality. (6)

April 4. 1845.

(5) Upon this subject the writer would strongly recommend the perusal of "Mechi's Letters on Agricultural Improvement." LONGMANS.

(6) The following list of prices and weights may prove serviceable to parties wishing to improve the drainage of their land or houses: —

TERRO-METALLIC TILERIES, TUNSTALL, NEAR NEWCASTLE, STAFFORDSHIRE.
THOMAS PEAKE, MANUFACTURER.

(Abridged by omission of various articles not connected with the subject of these letters.)

Extracts from Loudon's Encyclopedia of Cottage, Farm, and Villa Architecture. Longman and Co.

" These Tiles are made from a stratum of clay, containing a large proportion of iron; and when this clay is burnt, the tiles, or other articles formed from it, are almost as hard and heavy as cast iron. The articles made from this clay are called *terro-metallic*." (Page 25. sec. 50.)

NOTICES, ALSO DESCRIPTIVE REMARKS.

SOUGH GRATES prevent leaves, sticks, straw, and the like, from choking drains; and are well adapted for the sides of carriage drives, and gravelled walks, for court yards also, and almost every other situation.

TILES, IN FORM OF PIPES OR TUBES, FOR DRAINING, SOUGHING, OR CONVEYING WATER. The cylinders are a great desideratum, in all cases where soughs or drains are required; may be perforated with half-inch holes, either all over or partially, when intended as drains T. P. had the privilege to supply the London and Birmingham, and Birmingham and Gloucester Railways with the above; besides large numbers to the Great Western and other Railways; and, as he has reason to hope, to the entire satisfaction of the respective engineers. In regard to *conveying water*, the cylinders, with raised sockets at the joints, are in great demand for this purpose, where there is any degree of declivity. Spring water for dometic use runs through them without injury; and the cost of them is trifling when compared with lead or iron ones of equal diameter. May be sent to any part of the world stowed in vessels without packages.

IMPROVED WATER CHANNELS, TO PREVENT SLIPS IN THE SLOPES OF CUTTINGS OR EMBANKMENTS. Mr. Peake takes the liberty respectfully but strongly to urge the adoption of these tiles *as soon as any slope is ready to receive them*, and especially in ground which is likely to *give way*. He recommends the socket pipes to be divided longitudinally into two equal parts, and the sockets or rabbets to be as long as the angle of the slope may require, so that a *drop of water may not escape at the joints*. Some of the tiles of the main should be formed to receive branch channels at any angle, and a stone should be fixed at the bottom of the slope for the main to abut upon.

CHIMNEY FUNNELS. An Act of Parliament having been passed, and about to come into operation, to prevent the use of climbing boys; the circular funnels for casing the interior of flues, being easily cleansed by machines, require only to be made known to recommend themselves to the use of all persons who are erecting or altering chimneys.

CHIMNEY TOPS are found to answer the purpose better, with small holes pierced all over them, very near to each other.

An extra charge is made for piercing, dividing, or otherwise altering any article.

The manufactories are situated within 200 yards of the Trent and Mersey Canal; boats, &c., are *quickly loaded;* and goods are sent to any part of the kingdom.

Pipes, as well as other articles contained in the list, vary more or less from the above dimensions and weights; they are however as accurate as circumstances would admit and sufficiently so for general information.

Parties residing at a distance who are entire *strangers* to T. P., are respectfully solicited, in case of sending an order, to accompany the same by a reference, as is the custom in the commercial world.

In this list, a hundred means five scores, and a thousand fifty scores.

Prepaid letters would have full and prompt attention.

LETTER VII. — VENTILATION.

THOUGH we do not see the air, we feel it; and what is more, we breathe it. We live by breathing it. Insomuch that it has been well said, that as plants are children of the earth, so men are plants of the air; our lungs being as it were roots ramified and expanded in our atmosphere. And this in fact is the chief avenue, by which the damp and filth of a town that is not well drained and cleansed introduce their poison into the human constitution. The putrefying refuse, whether animal or vegetable, solid or liquid, dissolves itself into various pestilential kinds of

	PRICES, at Works.			WEIGHT. a Cwt. is 120lb.			
SOUGH GRATES.	£.	s.	d.	Cwt.	qrs.	lbs.	
43 Sough protectors, 12 by 12 ins., 2¼ ins. thick	0	1	0	0	0	23	each.
44 Ditto, 9 by 9 ins. 2 ins., thick	0	0	9	0	0	9	each.
GARDEN EDGING.							
45 Garden border tiles, 9 by 5 ins., 1 in. thick, with moulding	0	0	1	0	0	3	each.
46 Ditto, 12 by 6 ins., 1 in. thick, with bead at upper edge	0	0	2	0	0	6	each.
DRAINING SHELLS.							
47 Shells for draining, 12 ins. long, 4½ ins. wide at the bottom	0	0	1½	0	0	8½	each.
48 Ditto, 12 ins. long, 3½ in. wide, ditto	2	5	0	37	2	0	1000.
49 Ditto, 12 ins. long, 2½ in. wide, ditto	1	15	0	20	0	0	1000.
DRAIN TILES OR SOUGH PIPES.							
A 49 Cylinder pipes, 24 ins. long, and 12 ins. diam.	0	2	0	0	2	10	each.
50 Ditto, 18 ins. long, and 9 ins. diameter	0	0	9	0	1	10	each.
51 Ditto, 18 ins. long, and 6 ins. diameter	0	0	6	0	0	22	each.
52 Ditto, 18 ins. long, and 3 ins. diam. [rabbeted joints]	0	0	4	0	0	10	each.
53 Cylinder pipes, with raised sockets at joints, 2 feet long, 16 ins. diameter	0	4	0	1	0	15	each.
54 Ditto, ditto, 2 feet long, and 12 ins. diameter	0	2	6	0	2	28	each.
55 Ditto, ditto, 2 feet long, and 10 ins. diameter	0	1	9	0	2	4	each.
56 Ditto, ditto, 2 feet long, and 9 ins. diameter	0	1	6	0	2	0	each.
57 Ditto, ditto, 2 feet long, and 6 ins. diameter	0	1	0	0	1	19	each.
58 Ditto, ditto, 2 feet long, and 4 ins. diameter	0	0	9	0	0	26	each.
59 Ditto, ditto, 2 feet long, and 3 ins. diameter	0	0	7½	0	0	16	each.
60 Cone pipes, 20 ins. long, and 9 ins. mean diam.	0	1	0	0	1	13	each.
61 Ditto, 20 ins. long, and 6 ins. mean diamcter	0	0	7	0	0	28	each.
62 Ditto, 20 ins. long, and 4 ins. mean diameter	0	0	5½	0	0	15½	each.
63 Ditto, 20 ins. long, and 3 ins. mean diameter	0	0	4½	0	0	14	each.
CHIMNEY FUNNELS.							
64 Funnel pipes, 2 feet long, and 12 ins. diam. [other diameters to order]	0	2	0	0	2	10	each.
CHIMNEY TOPS.							
65 Chimney tops, 2 feet high, various kinds, in one piece	0	3	0	0	2	10	each.
66 Do, 3 ft. high, 15 in. diam. at bottom, in 2 parts	0	7	6	0	2	16	each.
67 Do, 3 ft. high, 10 in. diam. at bottom, in 2 parts	0	3	6	0	1	20	each.

gas, all the more largely mingled with the common air, in proportion as this is damp and warm. In some measure these noxious effluvia may affect the external skin, through its pores reaching our vitals. But it is by means of the lungs that the chief mischief is done; that atmosphere, which ought to refresh and purify the blood, coming charged with the elements of corruption; so that each time we take in a mouthful of air thus tainted, we admit, under the guise of a friend, a most subtle and deadly enemy, direct into the secret and defenceless inner chambers of the citadel of life. Ventilation therefore, to comprehend under that name a sufficient supply of fresh air to breathe, will properly follow on the subjects already discussed. And now, if our site has been well chosen, our town well sewered, our abode well drained, if all be kept clean and sweet by the free use of abundance of pure water, we may make sure, some would think, of fresh air; and we have nothing to do, but just to see that all our doors and windows shut close, and so with the addition of a good fire in cold weather, we may bid adieu to catarrh and cough, to fever and cholera, to scrofula and consumption. But why then have we been taking so much pains to make the air out of doors wholesome, if we never mean to let it come in plentifully, fresh and fresh, to circulate within doors; where most of the dwellers in towns spend the chief part of their time? (1) Are we not aware, that we cannot with impunity breathe the same air over and over again? Did we never hear of the Black Hole at Culcutta, and how many human beings there perished miserably in a few hours, simply by being kept crowded in a space where the air could not be changed as fast as they were breathing it? Let us be familiar with the true state of the case, namely, that every time we breathe, and we do this several times in a minute, from the moment of birth to that of death, day and night, waking and sleeping, working and resting, well and ill, without intermission, every time we breathe we vitiate the air taken into the lungs, by retaining one of its component elements, which combines with our blood, refreshing it and purifying it, whilst we return the remainder quite unfit to be breathed over again either by ourselves or by any one else. (See Vol. I. 132.) (2)

(1) "The ultimate object of ventilation is to supply the interior of apartments with air in a fit state for respiration. Now the means of supplying at a moderate cost the interior of apartments with fresh air, and even with warm fresh air, and of saving thereby a vast expenditure of fuel, are perfectly well known." (I. 34.) In the abstract of the proceedings at a public meeting of the Health of Towns Association, (p. 20,) it is mentioned, that "in the New Prison at Pentonville, from 30 to 45 cubic feet of pure fresh air is made to pass into every cell in a minute. This ventilation, and a temperature ranging from 52° to 62°, is uniformly maintained during the coldest weather at an expense of less than a farthing a cell for twenty four hours."

(2) "Each individual, in the course of the night, vitiates about 300 cubic feet of atmospheric air, rendering it quite unfit for the purposes

Hence it follows, that even one person, shut up in a small chamber perfectly air tight, could not live through a single day. ([3]) And it is computed that the population of a crowded town, by the mere natural action of their lungs, in the course of the twenty four hours, vitiate a layer of air, as large as the whole area inhabited, at least a yard in depth or thickness; to say nothing of the amount spoilt for purposes of breathing by fires and furnaces, lamps, candles, gas, gas works, and all manner of deleterious manufactories. (See I. 123.) Indeed were it not for the providential arrangement that the air thus vitiated by the lungs becomes at the same time heated, and is therefore always in motion to ascend, making way for fresh air to come and take its place, we should be in constant danger of suffocation, whenever we were in a room without a draft, or in a town without a wind stirring. This shews us the importance of so constructing streets and courts, as to make the most of the natural movements of the atmosphere; and also of so constructing each house and chamber, as to let in plenty of fresh air, however carefully we defend ourselves from wet and cold.

Before however we consider how things best might be, let us examine how things actually are, in respect to ventilation, amongst houses of the lower class in our large towns; and also what is the result as to sickness and mortality. Strange as it may seem, there are districts in which the inhabitants dwell so thick upon the ground, that this circumstance alone proves most injurious to health; it being impossible for them to get enough fresh air. Such at least is the opinion of persons very capable

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of respiration; and if we suppose thirty pair of lungs engaged in this process, we shall have 9000 cubic feet of air rendered noxious during the period of sleep. But the cubic contents of the cellars in question do not, on the most liberal computation, exceed above 2100 feet; which is the same thing as to say that thirty individuals are furnished with a supply of air insufficient for the wants of only seven. The Inspectors of Prisons in England recommend "not less than 1000 cubic feet" for every prisoner "as being essential to health and ventilation;" and yet here we have free agents voluntarily immuring themselves within a space which limits them to a supply of 70 feet, or less than one fourth of the minimum necessary for the purpose of healthy respiration." (I. 132.) This passage is rendered rather obscure by the reference to the "Inspectors of Prisons." The 70 feet is the thirtieth part of 2100, and is less than one fourth of the 300 cubic feet vitiated during the night, which I take as the minimum necessary for the purposes of healthy respiration. The circumstances of prisoners are somewhat different; and the passage would be rendered clearer by omitting the reference to them entirely. (MS. note, obligingly communicated by Dr. Duncan, whose Report on Liverpool is here referred to.)

([3]) It is known that a canary bird, suspended near the top of a curtained bedstead in which people have slept, will generally, owing to the impurity of the air, be found dead in the morning. And small close rooms in the habitations of the poor are sometimes as ill ventilated as the curtained bedstead." (I. 61.)

of judging, an opinion strongly borne out by the rate of mortality in districts thus densely crowded. There is one small portion of London which is peopled at the rate of 243,000 inhabitants to the mile square. But there is a district in Liverpool containing 12,000 inhabitants, in the ratio of 460,000 to the same space. And in a portion of this district, the larger part of it, they are crowded at the rate of 657,963 to the mile square; being nearly $2\frac{3}{4}$ times the maximum density ascertained in any part of London. (See I. 131. 155.) In one street of this district, the most crowded of all, it appears that one out of every ten of the inhabitants is annually attacked with fever. (I. 156.) There is a district in Manchester nearly as highly crowded, in which "the mortality is above twice the average amount." (I. 208.) And there is one pent up court in Liverpool (4), the most crowded of all, in which nearly one half of the inhabitants were affected with fever in one year. (I. 132.) The general condition of the town of Nottingham, "with respect to its health, is singularly bad," * * * "yet the site of the town is decidedly salubrious, and the occupations of the people are not necessarily unhealthy." (I. 329.) But observe now how the dwelling houses are crowded together. "With few exceptions, the houses are laid out either in narrow streets, or more commonly are built in confined courts and alleys, the entrance to which is usually through a tunnel from 30 to 36 inches wide, about 8 feet high, and from 25 to 30 feet long, so that purification by the direct action of the air and solar light is in the great majority of these cases perfectly impracticable. Upwards of 7000 houses (out of 11,000 in all) are erected back to back and side to side, and are of course by this injurious arrangement deprived of the means of adequate ventilation and decent privacy." (I. 318, 319.) Some statistics of the extraordinary density of population hence arising are then added; and these courts are described as being "almost uniformly closed at both ends, being entered by the tunnel already spoken of." Afterwards we are informed, that "the highest mortality occurs in the back to back houses of enclosed courts, situated within a few yards of the open and healthy neighbourhood, to the lowness of the mortality of which it forms a striking contrast." I. (332.)

Let us next view the inside of these dwellings; beginning with Whitechapel Union, in the metropolis. "I know of few instances where there is more than one room to a family." (I. 103.) For the state of York, see I. 224. (5) Next, in Liverpool, "it is

(4) In point of general density of population, Liverpool considerably exceeds all other English towns, having 100,000 inhabitants to the square mile; while Manchester has only 83,000, and Birmingham not more than 33,000 to the square mile. (I. 144.)

(5) "The District Visitors visited 1636 houses occupied by 2195 families in ten districts in York, of which number 202 were sub-let; they also in-

well known that in houses not exceeding twelve feet square, with one bed room and a low attic, there are often found from twenty to thirty persons huddled together. (I. 280.) In Nottingham, "rooms of eleven feet square often contain families of four, five, or six individuals, consisting not unfrequently of nearly related adults of different sexes, who live and sleep promiscuously." (I. 348.) In one of the districts of this town, the infant mortality is so enormous as to reduce the mean age at death nearly to eleven years, "and is distinctly traceable to the vitiation of the atmosphere occasioned by the overcrowding of families into a single sleeping apartment." (I. 333.) But besides crowding of houses, and crowding of rooms, there is also crowding of beds. Statistical inquiries, carefully made, have brought to light several such cases as the following: In 422 dwellings examined in Preston, containing 852 beds, there were 84 cases in which four persons slept in one bed, 28 cases of five persons, 13 of six persons, 3 of seven persons, 1 of eight persons, and one other family of eight "on bed stocks covered with a little straw." (I. 181.) This state of things could hardly be made worse by the practice of sleeping with the head under the bedclothes, of which the injurious consequences are shewn, Vol. I. 70. 73. But the lowest deep of all is in the Liverpool cellars, thus described: "The cellars are ten or twelve feet square; generally flagged, but frequently having only the bare earth for a floor, and sometimes less than six feet in height. There is frequently no window, so that light and air can gain access to the cellar only by the door, the top of which is often not higher than the level of the street. In such cellars, ventilation is out of the question. They are, of course, dark; and from the defective drainage, they are also very generally damp. There is sometimes a back cellar used as a sleeping apartment, having no direct communication with the external atmosphere, and deriving its scanty supply of light and air solely from the front apartment. Of the entire number of cellars, 1617 have the back apartment I have mentioned; while of 5297, whose measurements are given, 1771, or one third, are from five to

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quired the number of families with one, two, and three, or more rooms respectively, and the sleeping accommodation.

"From these inquiries it appears that in the parish of St. Dennis, in which strict accuracy was observed, from 8 to 11 persons slept in one room, in $4\frac{1}{2}$ per cent. of the families resident there; in $7\frac{1}{2}$ per cent. from 6 to 8 persons slept in one room; of the total 2195 families visited by the district visitors, 26 per cent. had one room only for all purposes; the highest proportion in one room was in Beddern, being $68\frac{1}{3}$ per cent.; the lowest in the parish of St. George, inhabited principally by artisans and small shopkeepers, where it was $2\frac{1}{2}$ per cent. Table I (Appendix) shews the average number of persons in one family in each of the districts inspected. The mean average is 4·12 persons; the highest (4·61) is in the parish of St. Dennis, the lowest (3·24) in the Castlegate district." (I. 224.)

six feet deep, 2324 are from four to five feet, and 1202 from three to four feet, below the level of the street; 5273, or more than five sixths of the whole, have no windows to the front; and 2429, or about forty-four per cent., are reported as being either damp or wet." (I. 127.) In cases where they belong to lodging houses, "at night the floor of these cellars, often the bare earth, is covered with straw, and there the lodgers, all who can afford to pay a penny for the accommodation, arrange themselves as best they may, until scarcely a single available inch of space is left unoccupied." "In every room of such houses, with the exception of the kitchen or cooking room, the floor is usually covered with bedsteads, each of which receives, at night, as many human beings as can be crowded into it; and this too often without distinction of sex or regard to decency." (I. 131.)

Some notion of the injurious effects of such an atmosphere on the health of human beings may be formed from considering a few striking facts observed in regard to the brute creation. "In the Zoological Garden, in the Regent's Park, a new house was built to receive the monkeys." Then follows an account of the expensive means adopted to make it warm, and air tight except at the skirting, as was supposed suitable to these poor natives of a hot climate. But out of sixty healthy monkeys put into this building, many of which had already borne several winters in England, upwards of fifty died within a month. This room "was as truly an extinguisher to the living monkeys, as an inverted coffee cup, held over and around the flame of a candle, is an extinguisher to the candle. It was only necessary to open, in the winter, part of the ventilating apertures near the ceiling, which had been prepared for the summer, and the room became at once salubrious." (I. 53.) And in the report of a physician, we find that true tubercular consumption is produced by this breathing of heated vitiated air, not only in the case of monkeys, but in cows and in horses; and to such an extent "that a saving of several thousand pounds per annum was effected by an easy improvement of the ventilation of the barracks near the metropolis." (I. 138.) The diseases which appear to be especially engendered by this cause, in the human frame, are fever, (I. 19. 120,) convulsions and other complaints fatal to infants, (I. 141,) consumption, (I. 102. 137,) scrofula, (I. 69,) deafness, (I. 75,)(6) besides many kindred disorders. The administration of medicine, in such situations, is pronounced to be of no use. (I. 115.) And even where active disease does

(6) "Amongst other forms of disease, which I think ascribable to the influence of vitiated air, is a large amount of what has not hitherto been ascribed to it, namely, deafness." See the whole passage, at I. 75, where the reasons for this opinion, founded upon the anatomical dissection of above 500 ears are given at length. Persons subject to this affection ought carefully to avoid close and crowded rooms.

not take place, the health and spirits are usually lowered to a degree inconsistent with the exertion of any earnest diligence, or with the enjoyment of any pleasures, except those of the most gross and debasing sensuality. (I. 115.)

The means of obviating these evils, or of securing a due supply of fresh air, will suggest themselves to any one who has well considered the above remarks on the subject of ventilation. Sir C. Wren's plan for rebuilding London after the great fire, (II. 478. 482,) shews that he was well aware of the importance of providing for a free circulation of air in streets. ([7]) (See also I. 33.) In each separate tenement care must be taken that there be no room inhabited below ground, or at all events none forming the whole of a habitation, nor any chamber in which there is not a chimney flue, and a window which opens freely. No houses ought to be built back to back, unless they have open space at the sides. ([8]) In each room much depends upon the judicious position of door and window, in respect to the fire place; so as to promote gradual change of all the air in the whole space, without any perceptible draft. But this object, which is at all seasons the great point to be attained, can be secured in cold weather only, and in all weather best, by openings through the walls at the bottom and top of each apartment, covered with plates of metal, such as zinc, pierced full of small holes; the upper one having its vent in the chimney flue. ([9]) However desirable it may be to have rooms of a good pitch, say at least eight feet high, it is gratifying to find, that by the use of these ventilators, even low and ill constructed chambers may be made comparatively healthy, at a cost of from two to three shillings each. The plans and descriptions are given at Vol. I. 77. 135, with results ([10]) as follows: "The people remark that

([7]) "This, the very foundation of all structural improvement, is now entirely neglected, left to the ignorance and avarice of the low class of men who usually erect such tenements; whereas under proper control, and by good arrangements, more accommodation might often be obtained for the tenants at less cost to the landlord." (II. 356.)

([8]) In many cases where houses have been built in low and close situations it would appear easily practicable to keep them always supplied with air conducted in piping underground from the summit of some adjoining elevation. Nor need we despair of having country air brought for the refreshment of invalids, no less regularly than water is at present, and much more abundantly, into the heart of the metropolis.

([9]) Mr. A. W. Gilbody, No. 8. Back Ridgfield, King Street, Manchester, supplies perforated zinc suitable for the purpose. The benefits derivable from the use of this material may be surmised from the following testimony:—"I may mention," says Dr. Aldis, "that I have become so much impressed with the importance of ventilation, that I have proposed to some of the committee of the Surrey Dispensary the application of the ventilators used by Mr. Toynbee as one of the most important charities that can be promoted in the overcrowded neighbourhoods." (I. 117.)

([10]) "An instance is stated of the scrofula having broken out at the Norwood school in 1832. There were then 600 pupils there, amongst whom

the ventilation has carried away the smells and purified the place. They have frequently said that they have been in much better spirits since they had these ventilators, and have always been most grateful for them; they have often been more thankful for the ventilators than for the flannel, and bread, and milk." (I. 77.) "The effect was that during the ensuing eight years fever was scarcely known in the place." This last remark relates to an assemblage of buildings at Glasgow, containing 500 persons, from which fever was seldom absent, and in which the proprietors of the factory, at the suggestion of the surgeon, "fixed a simple tin tube of two inches diameter into the ceiling of each room, and these tubes led into one general tube, the extremity of which was inserted into the chimney of the factory furnace. ([11]) By the perpetual draft thus produced upon the atmosphere of each room, the inmates were compelled, whether they would or not, to breathe pure air." (I. 135.) Simple methods for the efficient ventilation of whole houses, with plans, and details, are supplied at I. 119. 280. And there are some valuable remarks as to the means of regulating the current of fresh air, according to the force of the wind, at II. 328. Ventilation by mechanical force, independently of the wind, and with air artificially warmed, when needful, is shewn to be easily practicable. (I. 34. 50.) ([12]) And upon the whole, whilst it appears manifest that the subject is of incalculable importance to the well being of all classes, it is proved also, that though in some respects ventilation is more difficult to compass than drainage, in proportion as the element we have to deal with is more subtle, yet by a moderate application of skill in the builders, and of good sense in the occupiers, if the outer air be kept pure ([13]), the interior of the smallest chambers, in our

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scrofula had broken out extensively; a great mortality had occurred, which was ascribed to bad and insufficient food. The case was investigated by Dr. Arnott. The food was proved to be most abundant and good: and defective ventilation, and consequent atmospheric impurity, was assigned as the cause. Ventilation was applied by his direction; the scrofula soon afterwards disappeared And 1100 children are now maintained in good health, where the 600, before ventilation, were scrofulous and sickly." (I. 78.)

([11]) It has been suggested that it would be possible to diminish the risk of infection, by placing canopies over the beds, to collect the breath and exhalations from the body of the patient, and conduct them through a pipe or channel into a ventilating apparatus. (See I. 62.)

([12]) "I mean that it would be possible to move a mechanical ventilating apparatus at almost as little cost as to move a large clock by winding it up, and so, for instance, to supply the pure air required for a crowded evening party." (I. 59.)

([13]) It may perhaps be worth while to try what would be the effect upon the atmosphere of an apartment, in respect to healthfulness, of those galvanic wires, which appear to have such a salutary influence on the growth of plants.

lowest class of town dwellings, may be replenished at a very small expense, with an adequate and continually renewed supply of the most indispensable of all the elements of health and life.

April 11. 1845.

LETTER VIII. — VARIOUS LOCAL UNHEALTHY INFLUENCES.

THERE are various circumstances of a miscellaneous nature, not a little injurious to the health of those who dwell in towns, though less palpable in their form, less obvious in their consequences, or less general in their application, than the great sources of disease hitherto dwelt upon. One of these is the amount of Smoke, or finely divided soot, diffused throughout the atmosphere, and doing its share of mischief in every mouthful of air breathed by every individual. "The pollution of the air from this source," says a physician, in reference to York, not properly a manufacturing town, "must be extremely great, and injurious to the health. The injury done to furniture and clothing, and the additional cost of washing, must form no inconsiderable item in the expenditure of the citizens. The total amount, on a very moderate estimate, cannot be less than thousands per annum." (I. 225.) Another witness testifies as follows: "So long, however, as the smoke of our factory chimneys remains unconsumed, and large quantities of soot and small coal enter our dwelling houses whenever the doors or windows are opened, I am afraid that ventilation can only be partially effective in Ashton under Lyne." (I. 307.) Again, an eminent London builder, amongst many just remarks on this subject, observes "Those who wish to be cleanly are depressed by the difficulty there is in being so. It appears to me, that the first thing that ought to be done is to prevent the great smoke of chimneys; that ought to be stopped." (II. 277.) He particularly urges the removal of gas works "quite out of the limits of London;" suggesting, amongst other advantages, that if the public had to pay a little more for their gas, "they would want less of it, because the atmosphere would be better." (II. 278.) Gas itself may be next mentioned. It does mischief whilst burning, and much more if it leaks when not lighted. It vitiates a considerable amount of air out of doors, and still more injuriously within doors. It is the more injurious in proportion as it is imperfectly manufactured, or not thoroughly ignited at the burner. It is apt to escape by leakage, in rooms and in cellars, into water pipes whilst empty, (II. 54,) and thence into dwellings, and into sewers, (II. 109,) and thence through gratings into

the streets. And we have evidence that in two towns, York and Nottingham, a sample probably of many others, "an escape for the foul air" produced by its combustion within doors, "is very rarely provided." (I. 225. 348.)

Noxious Trades, including gas works, chemical works, manufactories of soap, candles, and of a great variety of other articles in constant request, are frequently carried on in the most populous parts of our large towns. They are detrimental to the workmen during their hours of employment, to all who dwell in the immediate neighbourhood, and, according to the state of the air, and the direction of the wind, more or less to the whole community. (1) "The process of dry grinding, especially needle pointing, may be mentioned as being particularly apt to induce consumption, from the inhalation of the metallic particles projected into the air." (I. 142.) Again, "Those who use glazed cards, for instance, little think how many palsied hands are due to the glaze which the manufacturers use." (I. 101.) Slaughter houses may be properly ranged under this head, on which the evidence is as follows: "By introducing living animals, and slaughtering them in different parts of the town, you bring into it, ostensibly for food, the whole of the animal, perhaps only

(1) The following passages render it probable that some employments, commonly accounted unhealthy, are not so necessarily, but only because they are carried on in ill ventilated apartments: —

"At three leagues from Amiens lies the village of Oresmeaux; it is situated in a vast plain, open on every side, and elevated more than 100 feet above the neighbouring valleys. About sixty years ago, most of the houses were built of clay, and had no windows; they were lighted by one or two panes of glass fixed in the wall; none of the floors, sometimes many feet below the level of the street, were paved. The ceilings were low; the greater part of the inhabitants were engaged in weaving. A few holes in the wall, and which were closed at will by means of a plank, scarcely permitted the air and light to penetrate into the workshop. Humidity was thought necessary to keep the threads fresh. Nearly all the inhabitants were seized with scrofula, and many families, continually ravaged by that malady, became extinct — their last members, as they write me, died *rotten with scrofula*."

"As to wool, I will mention a remarkable fact, communicated by Mons. Regnault. At Aubigny, a small town of the Department du Cher, scrofula, and *la teigne faveuse*, scrofulous eruption, are much spread among the working class, and to such a degree, that it is often impossible to complete the number of soldiers for the annual conscription, la teigne faveuse being, as is known, a cause of exemption. The disease is generally observable among the woollen workmen; but the greater part of the houses of business are very damp, lower than the grounds, imperfectly lighted by very small windows *never opened*, or by panes fixed in the wall, the ceilings being low. The workpeople seldom go out, except for an hour or two in fine weather; and during the night the re-union of all the family, in proportion as it is numerous, and the door closes more exactly, alters still more and more quickly the air already vitiated. There is no need to suppose a special action of the wool to explain the frequency of scrofula; it matters not what material is manufactured; when the workpeople are placed in the circumstances just mentioned, scrofula will soon appear." (I. 70. 72.)

two thirds of the animal being really useful for food? Yes." (I. 66.) "Other sources of unhealthiness may arise from the knackers' yards, in one of which I was informed that sixty horses were slaughtered weekly. Different kinds of animals are skinned here, and the bones boiled, which occasion a sickening smell; and heaps of bones may be seen in the yard, the washings of which, with the offal from the animals, are thrown into the Fleet ditch." (I. 116.) No wonder that under such circumstances, the Streams and Rivers running through our towns are often vehicles of pollution to the atmosphere, answering to the following description of the Medlock, in Manchester: "In addition to the filth drained from the streets and houses, it receives the waste from numerous dye works, print works, and factories, the whole forming the vilest compound of villanous smells that the most lively imagination can conceive. Part of this fluid filth is retained to feed the Duke of Bridgewater's canal, which for miles gives out its disgusting odour. A constant decomposition of the filth at the bottom of the canal is going on, and large quantities of carburetted hydrogen bubble up, causing an appearance like strong ebullition." (I. 213.) The dams and weirs, so commonly erected in the midst of towns, greatly enhance this species of evil. Thus, at Leeds, "The River Aire forms the natural main drain of the site of the town, and would, if it had been allowed to remain in its natural state, have carried off all the discharges of filth by a pretty strong and regular current. But it has been intercepted by a succession of dams for mill power and navigation purposes, which form a series of catch pits for the manure of its 120,000 inhabitants." (II. 436.)

I must not omit to mention, as another and totally distinct source of unhealthiness in towns, the practice of Burying the Dead in ground long since filled to repletion, and closely surrounded by the dwelling houses of the living. This system has so large an influence in polluting the air, and is connected with other evils of such serious magnitude, both physical and moral, that it has been made the subject of a separate enquiry and of a distinct Report, which was presented to both Houses of Parliament, by command of Her Majesty, in 1843. That Report is a document which demands the serious consideration both of the legislature and of the public. It has established the following conclusions: "That during the process of decomposition, which the remains of the dead inevitably undergo, a certain amount of most injurious exhalation takes place, with a force often sufficient to burst a leaden coffin, which at length finds its way through the soil into the atmosphere; so that in no case ought any dwelling house to be nearer to a burial ground than several hundred paces, more or less, according to the size of the ground, and the frequency of interment; that the length of time during

which a body is undergoing decomposition varies according to its age and the nature of the soil; that on an average there ought not to be much above 100 burials annually in an acre of ground, if we would allow time for the remains of the dead to be undisturbed as long as they are distinguishable from the soil, and also take due precaution against an unsafe amount of exhalation; that the general average of interments in the burial grounds throughout London is double what it thus ought to be, and that in some cases it is above twenty times this amount; and that where the ground is crowded, springs in the neighbourhood are tainted, so that pumps are disused, highly offensive exudations into the sewers are met with, the smell of the graves is complained of by those who dwell around, and the health of the neighbourhood is most seriously affected. It is further shewn that the present practice is no less inconsistent with due respect to the remains of the dead, than with due regard to the health of the living; and that, both on these points, and in a scrupulous deference to the feelings of surviving relatives, we have much to learn from the regulations and usages established amongst our neighbours and kindred in some of the chief towns in Germany. This Report has moreover brought to light the great extent to which an undue delay of interment is practised amongst the poorer classes, and how often in their crowded lodging rooms this circumstance proves injurious both to health and to those serious impressions which a death in the family would be likely to produce. The Report of the Health of Towns Commission does but slightly allude to the subject; but amongst the evidence, a physician on being asked his opinion as to the effect of these burial grounds on the atmosphere, replies: "There is no question that they render it in a great degree impure, offensive, and injurious. * * * Common instinct makes men loathe the idea of impurity from such a cause." (I. 66.)(2)

(2) "The state of the parochial burying-grounds of York must have a considerable and noxious influence on the atmosphere within the churches, and on that of the city generally, and on the water. The greater number of these grounds are of extreme antiquity, and must have been buried over very often. In fact, many of them are raised above the street level from the accumulated remains of generations. That of St. Michael, Spurrier-gate (now closed), is at least three feet above the floor of the church. A few years ago the ground of St. Helen, Stonegate, was raised three feet by fresh soil in consequence of the great number of bodies placed there. York having now an excellent cemetery, a strong feeling is very generally expressed against the continued use of these grounds for the purposes of interment. Graves are dug in the public thoroughfares and putrescent human remains exposed; nor is it an uncommon circumstance to see bones lying about. The analysis of the water from wells near St. Cuthbert's and St. Sampson's churchyards, shews that the wells are tainted by the drainage from these burying grounds, and there can be no doubt that the air is also polluted, not only by the direct emanations, but as well from the drainage from the bodies into the public sewers. Indeed, individuals have stated that they perceive the stench as they pass along the street." (I. 226, 227.)

And here it must be added, that there are certain moral, social, and political influences which bear injuriously on the health of those who dwell in towns, of which it is well that all should be aware, though they are far from admitting of as easy a remedy, as those which fall within the scope of mechanical arrangement. Moral Evils affecting health, especially prevalent in towns, arise from the more frequent presence, and more urgent solicitation, of the temptations to drunkenness and profligacy; combined with the difficulty of access to healthful sports and innocent amusements. Hence many a constitution is undermined in early youth, many a robust frame is reduced prematurely to the decrepitude of age, and many a family is brought into the world with an inheritance of rottenness in the bones, or of imbecility in the brains. As a specimen of Social Evils, we may take the case of excessive labour on the part of women and children, who often support their husbands and parents instead of being supported by their means; a state of things which, in our country at least, seems peculiar to the manufacturing district. For instance, one of the most competent of the witnesses before us observes, that he "has met with several cases," in Preston, "in which the husband was living in wilful idleness, supported entirely by his poor wife's wages, earned as a warper or power-loom weaver." And then he asks in sorrow, "Is it true that the characteristics of barbarism are most manifest among people whose women toil while the men are idle?" (I. 198.) We may venture to reply, that in such a case the proper duties of woman, as daughter, sister, wife, mother, are sure to be neglected, the home, the clothes, the meals of the family, become filthy, tattered, cheerless, to the detriment of the health as well as of the morals of all parties, and more especially to the injurious and often fatal neglect of her helpless infant. "Among the facts brought to light under this enquiry, one of the most remarkable is the extent to which opium is proved to be used by the poorer classes, and more especially the extent to which it is given by mothers to their children." Still more largely is it administered, whether in the form of "Godfrey's Cordial," or under the names of "comfort" and "quietness," by those who take in to nurse the infants of women working in factories. The result of this terrible practice is, that great numbers of infants perish, either suddenly from an over dose, or, as more commonly happens, slowly, painfully, and insidiously." (I. 13.) The way in which Political Evils affect the health of towns is most pointedly exposed in the case of Nottingham, where the freemen, being parliamentary voters, by their sinister influence over the corporation have succeeded in defeating the progress of improvements, and where the corporation have even employed the public money in opposing legislative measures conducive to health. (See I. 343, 344.)

There is probably no town in all the realm, in which the evils referred to in these letters have run to a greater extent than in Nottingham, certainly there is none in which the terrible consequences have been more wilfully and wantonly incurred. And all this is to be accounted for in no small degree by the circumstance thus significantly stated: "The cry is always raised, Why, it is the Black party or the White party who are moving this; they only want to tax you; vote for us, and we will protect you. Under the influence of feelings thus excited, the working classes almost invariably act in direct opposition to their real interests." (II. 94.) And last of all, Individual Selfishness, an evil, moral, social, and political, may be seen exerting its utmost force, in the shape of undisguised covetousness, to resist improvements essential to the health of the community. Thus in Nottingham, "the owners of the small houses, in the most crowded, unhealthy, and altogether worst conditioned districts," are in the habit of opposing measures for improvement with this outcry, "our houses will be emptied." And in Preston there is a street deprived of due drainage, "because one proprietor says, that it will make too good a road to a neighbour's property, and improve that too much." (II. 93. 153.) Such selfishness is indeed easily shewn to be mistaken and shortsighted; all such property being sure to be depreciated by a state of things, which as it impairs the health of the occupiers, renders the payment of rents uncertain, and increases the amount of rates for the poor. But this is no more than may be proved of all selfishness, and indeed of all moral evil whatsoever; it is blind, it is suicidal in its results. Meanwhile, in this case, as in most others, it is a pregnant source of mischief and of misery to all who dwell around. For however clearly we are able to demonstrate the eventual economy of measures tending to promote the health of a whole neighbourhood, we shall not easily bring the selfish to believe, that they can secure gain for themselves by conferring a benefit on their neighbours. Hence it becomes necessary to denounce selfishness, as one aggravating source of our maladies; and as far as possible to put it out of countenance, or rather to root it out of the heart. And as I purpose to shew, before the conclusion of these letters, how seriously the neglect of health, in providing dwellings for the poorer classes, tends to lower the tone of their morality, so I feel it important to note here, that nothing would do more towards improving the present abject condition of many of their homes, than an enlarged sense of moral duty and of religious responsibility, on the part of those who have to answer for the possession of property, influence, or authority.

April 18. 1845.

Letter IX.—PUBLIC BUILDINGS AND ASSEMBLAGES.

In considering the sources of ill health affecting those who dwell in towns, our attention has been chiefly directed hitherto to the state of each man's own home, and to the damage done by the nuisances in his neighbourhood to the air which there he breathes. Let us next consider the condition of those various public buildings and apartments, which are resorted to by crowds, more especially in towns, whether for work or for amusement, in the pursuits of peace or in those of war, for the purposes of conference, or of litigation, of correction, of instruction, or of worship. Our Factories, and the system of working in them, as affecting both health and morals, have of late engaged a large share of public attention. In these establishments, there must obviously be great risk of harm to multitudes, if there be neglect of drainage or of ventilation, or of certain indispensable arrangements for separation, privacy, decency, and cleanliness. If however these points are thought of and cared for, the presence of water, of machinery, and of steam, gives great facility for providing and securing them, at once economically and effectually. And happy is that master manufacturer, whose capital and skill, under the guidance of humanity, aim at combining the welfare of his workpeople with his own prosperity; providing for thousands of men, women, and children, the benefit of working in so fresh an atmosphere, and under circumstances so favourable to modest self respect, as must tend to keep them healthy, and cheerful, and steady at their work, instead of being weak, and weary, and indolent, deformed, dejected, and depraved. But not to dwell on a subject of distinct national importance, let us survey one or two Public Workshops on a smaller scale. In the evidence, we find an accurate description of such as are generally tenanted by tailors in the metropolis, which, whether built for the purpose, or adapted by piecemeal as business increases, consist usually of a succession of floors, communicating by an open staircase, filled as full as possible with workpeople, warmed by stoves, lighted by gas, and made still more close by the constant use of hot irons. In such places, the occupiers of the upper chambers breathe the air which comes vitiated from the floors below. And accordingly the witness, a physician, states, that in one instance he found in the uppermost floor ten men out of seventeen subject to diseases of the chest, but only one out of fifteen in the room beneath; and that in another instance he found in the upper room ten invalids out of twenty occupiers, and in the lower room three out of fifteen. He also compared a

set of rooms containing forty men, measuring their dimensions, with another set of rooms containing forty men in double the cubic space, their situation in all other points being similar; and he found in the former twenty invalids, but in the latter only seven. (I. 95, 96.) Printing offices (let the press therefore look to it) are enumerated amongst the workshops thus injuriously overcrowded. (I. 97.) And the witness, having stated that "the men who use strong exertion in their employments are less injuriously affected by the unwholesome state of their workshops, than those who use little exercise," illustrates his assertion by a table of the comparative ages of compositors and pressmen. To which is added, "Do you find that the compositors are more liable to pulmonary consumption than the pressmen? Decidedly so. — Exercise then in some degree counteracts the ill effects of impure air? Yes; and for this reason it is better that people who are invited to breathe foul air in ball rooms should dance than that they should sit still." (I. 98.)

From the employments of peace let us turn for a moment to the Scenes of Warfare. If ever a town is to the utmost degree unhealthy, it is a town in a state of siege, or of blockade; its homes doubly crowded by it defenders and their retinue, and the wounds which man purposely inflicts on man added to the ills which by negligence he entails upon himself. But not only besieged towns and fortresses, camps also in the open country[1], and barracks in the healthy suburbs of a town, have often given deadly proof of the injury to health sure to arise, however sound men may be in constitution, however well clothed and well fed, if they abide in a site which wants drainage, or where their refuse is not duly removed, or where there is no adequate supply of fresh air. Not to go back to ages when these matters were never so much as thought of, the records of the last great European war would prove, if they were examined with a view to this point, that however many lives were lost in battle, many more were sacrificed in swamps and in crowded hospitals, beneath suffocating tents, or between the decks of heavy laden transports. A case is mentioned incidentally, in the evidence, of "2000 British seamen dying in one fleet from fever and want of ventilation." (I. 60.) The state of things, till of late, universal on board of ship, is indeed one of the most striking proofs of how much health depends on due attention to the supply of pure water and fresh air. However exhilarating the atmosphere on deck, the amount of sickness, often very great

[1] Thus Homer, whom nothing escapes, represents Phœbus, the force of the sun, as breeding a pestilence in the camp of the Grecians. In the late Chinese war, the mortality arising from foul air in a deserted filthy town was such, that more than half the men in one regiment, the 26th, Cameronians, were carried off by dysentery at Chusan within six weeks.

indeed, always bears proportion to the closeness and the filthiness below. And they who are borne round the world by winds upon the ocean become victims of "ship fever," as it is called, because in the interior of the vessel, where they eat, and rest, and sleep, they stint themselves in fresh air to breathe, and in clean water to wash with, whilst they have an unlimited supply of both close at hand.

But to return to towns. Let us next consider places of public resort, for the purposes of business, conference, or amusement. We shall need no evidence here, beyond our own experience, to prove how disagreeably close such places commonly are; how little pains, or rather none, are taken, to secure the great object of ventilation, most important to the health of all assembled, namely, a gradual change of the whole atmosphere within doors, by a fresh supply from without, brought in continually and imperceptibly, equable in temperature, and equably throughout the whole area and space. Let those who attend Public Meetings of any kind, commercial, literary, scientific, or religious, let those who frequent Theatres, Balls, or Concerts, public or private, for the latter in point of crowding are as bad as the former, let those who help to throng the vulgar tap room, or the select snug parlour of the public house, be aware, that it is not the exposure to weather out of doors, but the pestilential air they breathe within, which chiefly accounts for their catching so many colds, and laying the foundation of so many deadly complaints, when they resort to these public assemblages. The sudden change of temperature from hot to cold doubtless does its share of harm, especially at night; much more the intemperance and debauchery, of which some of these places are the scenes or stimulants. But the breathing of air already vitiated by the lungs of our companions is the one uniform cause, constantly, secretly, but surely acting, in every case, by itself, as well as rendering all others doubly mischievous to the health of the human frame. And yet so little was this understood till quite of late, that even the Hospitals, another kind of public building, have been often nurseries, not of health, but of disease, owing to the neglect of supplying pure air throughout the wards. "Formerly, before attention was paid to ventilation in the construction of our public buildings, destined for the reception of large numbers of inmates, fever was never absent. * * * So much was this the case, that the disease obtained a specific name, from the circumstance; "gaol fever," "hospital fever," "ship fever," "camp fever," being terms constantly met with in medical writings." (I. 134.) The case of a metropolitan Lying-in Hospital was referred to in Letter IV, in which perfect ventilation, combined with drainage, put a stop to the occurrence of puerperal fever. (I. 119.) The state of workhouses, under the old system, a kind of hospital for infirm

paupers, may be collected from the following remarks on one at York. "The female patients' day and night room is ventilated through the women's infectious room; and the infectious room for women is ventilated through the sick aged women's day and night room." (I. 226.)

We have yet one other class of public buildings to consider, in which men meet for the most important of all purposes, those of law, of education, or of worship. In these, where every faculty is on the stretch, and has to be exerted in its utmost vigour, no outward appliance ought to be withheld, which can assist in the free exercise of the functions of the brain. They who make our laws set us a good example in this particular. Having much need to speak, and sometimes in a numerous assembly, they have an eminent physician responsible for supplying them with abundance of fresh air, one of the most essential elements of utterance. In our courts of justice, on the other hand, the air is usually so foul, owing to the crowds assembled, and to the neglect of ventilation, that the judge and jury, the counsel and the public, all complain of the same oppressive languor, and suffer more or less the same serious consequences of temporary suffocation. (2) Prisons, the public dwellings of culprits, or rather their solitary homes, used to be still worse, the worst of all. But now, thanks to the impulse given by the exertions of a Howard, the horrors of imprisonment are mitigated by the circumstance, that these abodes are often better calculated for the maintenance of health than either the courts of judges or the homes of jurymen. "The Inspectors of Prisons in England recommend not less than 1000 cubic feet," equal to a space 10 feet long, and wide, and high, "as being essential to health and ventilation. And yet here," says a witness, speaking of the Liverpool cellar lodgings, "we have free agents, voluntarily immuring themselves within a space which limits them to a supply of less than one fourth of the minimum necessary for healthy respiration." (I. 132.) And in the Report on Preston, by the Chaplain of the House of Correction, one of the best ordered prisons in the realm, we find the following official statement of a fact otherwise incredible: "The mortality in the town of Preston, for the five years ending June 30. 1843, has been proportionately 17 times as great as that which has taken

(2) "Even where the individuals who generate the poison remain free from its effects, they may communicate the fever to others, as was the case in what is known, from that circumstance, as the Black Assize at Oxford in 1577, where the Lord Chief Baron, the sheriff, and about 300 more, (all who were present in the court,) were infected by the prisoners, and died within forty hours; and also in the famous Old Bailey session of May, 1750, in which most of those present who occupied one side of the court, (including the Lord Mayor, two of the judges, and one of the aldermen on the bench,) so as to receive the emanations from the prisoners' bodies, contracted fatal typhus." (I. 134.)

place within the prison walls. * * * Or if, in the comparison, we place against the deaths in the prison those only in the town which take place after 21 years of age, and call them for the five years (see Table 6,) 2556, we still have an excess of nearly 2000 deaths above what would have taken place, had the same ratio obtained in the town which obtains in the prison." (I. 178.) Schools, which, if well ordered and adequately supplied, would go nigh to supersede the costly apparatus of jails and jail deliveries, as well as that of civil litigation, present some of the most striking proofs of the extent to which neglect or ignorance prevails, as to much that deeply concerns the bodily health, the moral habits, and the intellectual progress of the assembled children. At Nottingham "the British and Foreign School, a considerable building in Canal Street, in which a numerous body of children receive education, is actually built upon the arch of the Leen, the principal and foulest sewer in the town." (I. 317.) Another school in the same town, "from want of available land, is built in the corner of a crowded burial-ground, immediately fronting another similar place of interment, and alongside an alley, till recently, if not now, in the occupation of the lowest characters." (I. 319.) There is a detailed account of the dame schools, and other private schools, in Liverpool, resorted to by many thousands of children, often held in cellars or in garrets, which serve at once for "dwelling, dormitory, and school-room;" all of which seem to be conducted on a principle which was thus avowed by the mistress of one of them — that "the children thrive best in dirt." (I. 146, 147.) Nor are schools for the more wealthy classes always much better ordered, in the essential point of ventilation, or in some other matters here insisted on. The frequent occurrence of fever in our first rate public schools is notorious. The governors of these and similar institutions may find proof in the evidence before us, that not only fever, but also scrofula and consumption will cease to afflict those for whose health they are responsible, in proportion as they are taught, and fed, and lodged in buildings duly drained and eligibly situated, and in clean, spacious, and well ventilated apartments. (See I. 53. 85.) These remarks apply also to lecture rooms in colleges, schools of anatomy, reading rooms of libraries, mechanics' institutes, and all similar establishments. Lastly, Churches and Chapels, though more lofty than schools, are usually less in area, in proportion to the numbers frequenting them; and though in most cases they are occupied for fewer hours in the week, they seldom profit by much pains taken to change the air whilst they are unoccupied. And when, further, the effluvia from vaults and graves have access through the floor, stimulated by hot air flues, or hot water pipes, or, it may be, mingled with the smoke of common stoves, and with the addition of gas lighted at the evening service, which is usually the most

thronged, then these, the most important of all places of public resort, prove the most injurious to the health of those who resort to them. "In regard to churches," says a medical witness, "many illnesses and deaths proceed from faults of ventilation and warming; from the rush of cold air in one place on those who sit near the doors and windows, and the want of fresh air in other places." (I. 60.) And if such be the case with the congregation, in a building often of the most costly character, wherein a trifling expense would permanently secure abundant ventilation, what must be the injury sustained by the preacher in the pulpit? Placed on a height at which his voice acts at a disadvantage, as if on purpose that he may breathe an atmosphere composed of the breath of all who sit beneath him on the floor, he has to exert his lungs to the utmost pitch, whilst they have the worst of air to work with. And the more promising his talents, the more successful his exertions in interesting and edifying a multitude of hearers, so much the sooner is he likely to be consigned to silence, consumption, and the grave. Still more pitiable, if possible, is the lot of Sunday School children, whom modern architects, and committees, and commissioners are apt to place in the recesses of a lofty roof. Above the vent afforded by the windows, and with rarely any ventilation in the ceiling, they have the foul air of the whole building in a sort of halo round their heads. And there, where they can scarcely see the minister, much less hear him, with perhaps little convenience for sitting, and none for kneeling, and with their attention previously exhausted in school, they are required, under penalty of chastisement, to keep still, and silent, and awake, in an atmosphere, which of itself is quite enough to produce in a grown person, much more in a child, inattention, restlessness, and drowsiness. To say no more of the unhealthiness of a position such as this, I cannot refrain from expressing my apprehension, that there must be hundreds of thousands in the land, who, having had these for their first impressions of Divine Service, have hence conceived a deep and lasting aversion to the House of Prayer.

April 25. 1845.

Letter X. — DEMORALISATION.

Whilst we have been considering the amount of mere bodily disease, incurred by the neglect of certain points essential to health, in the arrangement and construction of town buildings, we cannot but have occasionally caught some glimpse of the detriment hence arising to the moral and religious interests of

the community. This is a subject which I trust we all feel to be of paramount importance; and to which I propose in the present letter to direct exclusive attention. Not that I consider it, as some perhaps would do, the only point worth thinking of. Though eternity is every thing, yet time is something. And though the soul is the man, yet for the present it is in union with the body that it is so. And therefore it is a very serious evil for millions of our fellow creatures to be needlessly exposed to so much of bodily discomfort and disease, as has here been brought to light, though it be but for the few years of this transitory life. And even if we had no further object than preventing sickness and restoring health, we should be acting under the sanction of a divine example, in endeavouring to secure for the poor, and for their families, homes clean and sweet and wholesome, with a view to their enjoying vigour of constitution and length of life. But in truth we have a further object; great moral and religious interests are, we believe, at stake. For the habits of life forced upon the poorer classes, to a great extent, by the faulty construction of their dwellings, are, as will now be shewn, not only most serious hindrances to the progress of true piety, but also most active incentives to the practice of gross immorality. And here, as on a former occasion, I regret that I cannot help presenting some details of a nature shameful to speak of, and horrible to contemplate. But the truth must be stated plainly, and the whole case exposed faithfully, in order for the remedy to be applied effectually.

I have no express evidence to produce in proof, that the evil influences referred to in these letters, primarily as affecting health, are also seriously injurious to the high religious proficiency of those who dwell within their reach. And I willingly admit that as there is no limit to that divine power, without the help of which such proficiency is hopeless, there may be exceptions to this general rule; just as some persons are found to attain to a great age in situations most adverse to length of life. (I. 181.) Further, I am well aware, that such proficiency as man can see is no sure standard of faith and duty for the future judgment; and that in proportion as circumstances are more adverse, there is more room to hope that much will be forgiven. But I speak of proficiency manifestly attained, and manifestly ministering to a man's own happiness, and to the glory of his Maker. And I hold, that whatsoever tends to hinder the general progress of the poorer and more numerous class, in those principles and practices which alone can confer on either poor or rich any measure of heaven upon earth, is an evil to be most urgently deprecated, and, as far as possible, most diligently remedied. Hence it seems not easy to attach too much importance to the considerations lately brought forward on the state of churches and chapels; especially considering that the

working classes, much more largely than others, are dependent for their instruction in religion on the ordinance of preaching. The same may be said of the evidence on the state of school rooms; to which must be added the following testimony, bearing on the selection of their sites: At Nottingham "the Boys' National School is in one of the most degraded and vicious neighbourhoods, a neighbourhood in which moral precept is more than likely to be counteracted by immoral example." (I. 319.) But it is not so much in the state of public buildings, however important their uses, as in the condition of the private dwellings, that the weight of this argument lies. For to what purpose should we train children at school ever so efficiently, if they must daily return thence to homes destitute of order, cleanliness, and decency? And how many grown persons, out of homes full of all manner of uncleanness, are likely to take pleasure in public worship, or to derive profit from pulpit exhortation?

Leaving these questions, and the above general conclusion, to every man's own judgment, I proceed to illustrate the directly bad moral tendency of the state of things which prevails in the lower class of dwellings; our evidence here consisting chiefly of opinions, but these the opinions of competent judges, founded on large experience, and in some cases admitting of proof by facts. And, first, as to the damage done to good habits previously formed. The witness to whom we owe most full information as to the state of Nottingham, remarks: "Hence, as a consequence of the usual accommodation of feelings and habits to external circumstances, results a carelessness or neglect of domestic cleanliness and comfort, and a strong tendency to a lower position in the scale of civilisation." (I. 346.) And again: "The habits of a working family are more depressed and deteriorated by the defects of their habitations, than by the greatest pecuniary privations to which they are subject. The most cleanly and orderly female will invariably despond and relax her exertions under the influence of filth, damp, and stench; and at length, ceasing to make further effort, probably sink into a dirty, noisy, discontented, and perhaps gin drinking drab, the wife of a man who has no comfort in his house, the parent of children whose home is the street or the gaol." (II. 75, 76.) Another witness, who has set before us the state of much of the metropolis, a prime mover himself in the whole enquiry, states his conviction, that "a filthy, squalid, unwholesome dwelling, in which none of the decencies common to society, even in the lowest stage of civilization, are or can be observed, tends directly to make every dweller in such a hovel regardless of the feelings and happiness of each other, selfish, and sensual; and the connection is obvious between the constant indulgence of appetites and passions of this class, and the formation of

habits of idleness, dishonesty, debauchery, and violence." (I. 29.) And again: "One of the most melancholy proofs of this is the quiet and unresisting manner in which they succumb to the wretchedness of their lot. They make no effort to get into happier circumstances." (I. 10.)

It is not possible in this evidence, any more than in the effect of these evil influences on the character, to separate the subversion of good habits from the growth of those which are bad, which is the point chiefly to be illustrated. The witness last quoted, speaking of children brought up in the class of dwellings here referred to, remarks, that if they "escape with life, they must be a constant burthen on the state; and it is found that even those who do endeavour to support themselves, usually adopt all sorts of expedients to shun any thing in the shape of labour, betaking themselves to such occupations as do not require any great amount of physical exertion." (I. 14.) A gentleman who speaks of having himself, in his early years, assisted as a workman in constructing those dwellings and sewers in Liverpool, on the state of which he gives a most valuable report, thus sets down the result of his enlarged experience: 'I have invariably found that crime is more or less associated with filth and discomfort. * * * And I am convinced that better ventilation, better drainage, a good supply of water, and that supervision which would result from these objects being generally carried out, would be attended with the happiest results to public morals." (I. 281. 290.) In regard to intemperance, a London surgeon remarks, "It was only this morning that a patient stated, that she could not drink the water that was supplied to the house, it being 'full of insects.' Patients have said that they only drink water when they cannot get beer." And again: "I must confess that the wonder to me is, not that so many of the labouring classes crowd to the gin-shops, but that so many are to be found struggling to make their wretched abodes a home for their family." (I. 81. 84.) So also testifies one of the physicians of the London Dispensary: "The depressed and low condition of health in which these people are always found, induces habits of intemperance, unfortunately so common among them." (I. 115.) To which may be added the emphatic words of a master builder in the metropolis: "It may be taken as an axiom, that if you make a working man's home comfortable, he will give up the public-house and its ruinous consequences; and that where a working man's home is little better than a pigstye, that man will be almost an inhabitant of the public-house or beer-shop. I say this confidently, from my experience of the habits of large numbers of the working classes." (II. 303.) After idleness and drunkenness, and their results in crime, we must next glance, though with reluctance, at the great amount of indecency, and of its demo-

ralising consequences, here forced upon our view. On one branch of this painful topic, "I have no evidence," says a competent witness, "of any actual licentiousness resulting from both sexes and all ages, of perhaps twenty families, using the same necessary; but it must undermine modesty at least." (I. 212.) Another, speaking of matters like these as "unquestionably of the last importance to the health and comfort of all classes of the community," reports, that dwellings of the lower class in Nottingham are entirely destitute of private conveniences, "and of the not less needful provision for the separation of the sexes," where such conveniences are public. (I. 347.) Another declares, "I know scarcely any thing so demoralizing and degrading, as the common privies to various courts in towns, and to clusters of cottages in villages." (I. 107.) On the other branch of this topic, the community of bedrooms and of beds to all ages and to both sexes, let a portion of one melancholy passage suffice. "I have myself," says a London physician, "seen a young man, twenty years of age, sleeping in the same bed with his sister, a young woman sixteen or seventeen years old. That incestuous intercourse takes place under these circumstances there is too much reason to believe. And that when unmarried young men and women sleep together in the same room, the women become common to the men, is stated in the evidence as a positive fact. But I regard another inevitable effect of this state of things as no less pernicious; it is one of the influences, which, for want of a better term, may be called unhumanising, because it tends to weaken and destroy the feelings and affections which are distinctive of the human being, and which raise him above the level of the brute." (I. 32.) Those who would see more proof on this point may refer to this whole passage; and to Vol. I. 115. 181. 347, 348. No wonder that where parents are such as these, the life of infants is often sacrificed, as shewn in the evidence before us, to ignorance the most gross, to use of opiates the most poisonous, and to love of money the most unblushingly avowed. (See I. 183. 188. 191.)

We are thus brought to the lowest point of moral degradation, the corruption and decay of natural affection; that havoc of the conjugal and parental ties which severs the first bonds of all human society. Henceforth there is no foundation left for the true principle of social and political morality, namely, the love of each man for his neighbour as a fellow member of the body politic. Nor is it possible that this state of things can extend widely, or last long, in one class of the community, without in some measure infecting all the rest. Repulsiveness begets repulsion; hate, hatred; and jealousy, suspicion. In the lack of all neighbourly communion between the employed and their employers, there is room for a state of feeling which is described by one of the witnesses as common among men "not

necessarily hardhearted." "They form a low estimate of the value of life and health. A man dies, and another replaces him without cost to his employer: but if it were a horse or a dog, the owner would have to pay for a new one. This makes all the difference." (I. 101.) And as to the neighbourly visitation of the poor by the wealthy, the surrounding circumstances of indecency often absolutely preclude the gentle and soothing agency of such kindness on the part of female neighbours. Independently indeed of this hindrance, the general unhealthiness of the atmosphere of towns has a most injurious effect on the relations of society, by inducing all who can afford it, including in some cases even the clergy and the medical practitioners, to remove into the suburbs. And yet the actual presence, and the familiarly known habits of a Christian family, the sanctifying influences of a Christian home, as an accessible centre of the charities of life, and an energetic source of their diffusion, these are amongst the chief means of doing good to our fellow creatures, whatever be our rank or calling; for these no subscriptions to societies, no attendance at committee meetings, can avail as substitutes; these tell better even than visiting in private, or than preaching in public; and, but for these, our town parishes might just as well be served by some monk from his cell, or by some hermit from his cave in the desert. Nothing surely would do more to restore a healthy state of moral feeling between the different classes of society in our cities, than to render them eligible and enjoyable for the homes of the best informed and best disposed of the most thriving and most bountiful of the citizens. Nothing surely is more formidable, in the contingency of any civil commotion, than that in a community of a hundred thousand souls there may probably not be a magistrate to be met with, during the many hours of the night, and during some also of the day, scarcely one who really lives within the town; no, nor any man, at all events not many, whose education, character, and independent position, are such as to confer authority or command respect. The tendency to breed civil commotion, as well as to diminish the means of quelling it, forms one of the most serious of the moral evils resulting to society from the state of things here described. With two passages from the evidence, bearing in connexion on this important point, I conclude the present letter: "Amidst the dirt and disease of filthy back courts, and alleys, and yards, vices and crimes are lurking altogether unimagined by those who have never visited such abodes. It should be remembered, too, that these reservoirs of contagion, under certain conditions of the atmosphere, or some other not improbable contingency, may suddenly overflow their usual boundaries, and devastate neighbourhoods, the inhabitants of which are now unconscious of their proximity to such danger." (I. 198.) "If, throughout

England, the cholera of 1832 had been one half only so fatal as the black death of 1349, or even as several of the later epidemics, the framework of society would have been loosened, and the empire in danger of being broken up. Those acquainted with the social effects of these scourges upon the thinly scattered population of the middle ages, would anticipate no less than this from the destruction of five or six millions of persons in England within a few months. The utter depreciation of property, terror, despair, and a total abandonment of all social ties, would have been the consequence. * * * It must be remembered, Government was quite unprepared for results of this kind; the mortality only was thought of. * * * We may infer from the experience of preceding epidemics, that the cholera will break out again, and its second advent may be with such a coincidence of atmospherical phenomena as to equal in destructiveness the most virulent of the pestilences recorded in history. We may hope that this will not be the case; but when the momentous results of such a return are contemplated, society should have a more rational and certain safeguard against this and similar epidemics than an amiable hope." (I. 263, 264.)

May 3. 1845.

LETTER XI. — TOWN AND COUNTRY COMPARED.

ALTHOUGH the inquiries of the Commission, to which these letters refer, are directed properly to the health of those who dwell in towns; yet, considering how large a number of dwellers in the country have their health affected by the like circumstances, I think that it will be well, before I conclude the subject, to compare town and country. In both cases there is much the same amount of ignorance and indifference to this matter, even on the part of those whose most important interests are at stake. And since it is proved by the returns of the Registrar, that our country population attains to a decidedly higher average of health and length of life, in some counties to nearly double the amount enjoyed in many towns; (see vol. I. 122, 123;) if it should appear, on a comparison, that this benefit is compatible with the like neglect of all sanatory precautions, and often under the greater disadvantages of the two; this will give fresh weight to the force of our conclusions, as to the paramount influence of that, in which alone there is always a wide distinction, namely, the free access of abundance of pure air. Following then the course of topics previously pursued, I observe, that in the choice of site for a town, it is often practicable to take into account the question of its healthiness; whereas

the dwellings of labourers in agriculture must of necessity be situated in all parts of the country, whether healthy or otherwise. Again, in regard to sewerage and drainage, and in the constant supply of water, the combined resources of numbers in a town always might, and often do, secure an amount of convenience and cleanliness not so readily to be compassed in the solitary cottage. It is only in a first rate country mansion that we find water supplied on every floor, for use in the chambers, and for riddance of the refuse; an arrangement common in the lowest class of houses in some of our towns, and applicable in all. The cottage housewife, on the contrary, often has to fetch her spring water from a distance, and is apt to empty out her slops and refuse close at hand; to take their chance of being washed away by the drippings from the roof, or of stagnating all together in a muck heap opposite the door, free to soak into the surrounding soil. Indeed the principal pursuit of those who labour in the country depends so much upon the application of manure, that most of their houses, large and small, are garnished with a stock of this commodity. And the inhabitants, being seldom aware how much of its efficiency is lost as it lies fermenting in exposure, take no pains to prevent a process which vitiates their atmosphere, whilst at the same time it impoverishes their land. This mass of putrefying matter, crowned often with the spoils of some neighbouring town, and built up as close as possible to the surrounding sheds and stables, must prove seriously injurious to the cattle, as well as to their owner and his family. Nor is the mere breath of the animals a trifle, when they are crowded in buildings neither drained nor ventilated, neither washed with water nor with lime; especially when they are affected, as often happens in such cases, with fatal epidemic diseases. Crowded stables, with their pent up yards, and the effluvia thence arising, might indeed have well been mentioned among the circumstances which help to vitiate a town atmosphere. In the country, where horses and cattle are often stalled in large numbers close to dwellings, with no reference, in adjusting the site of the farm yard, to the prevalent direction of the wind, the evil would be of serious magnitude, were it not that the poison thus recklessly engendered is for the most part diluted by free currents of fresh air. That this does not always suffice for security, is proved by the remarkable prevalence of scrofula, in "villages built in the narrow gorges formed by the approach of elevated mountains, as is seen in the Alps and Pyrenees, and especially in those of the valley of the Rhone. The air respired habitually in these gorges is stagnant, humid, warm, and corrupt; its removal is very difficult." (I. 72.) There are picturesque situations in our own country to which this evidence would in some degree apply. Let no man build a dwelling for his fellow creatures in a site pleasing to the eye, if

it be at the same time injurious to health. There are days in our own climate, when the air of the open country is as stagnant as in an Alpine gorge. Let no man harbour, one hour longer than he can help it, close to his own abode, that which in such weather might breed a fever in his family.

After all these drawbacks, the outer air in the country is usually far better than in a town. And this constitutes the great advantage of the country in point of health; especially as the countryman works chiefly out of doors. For within doors he has as little means as the townsman, often less, to ensure a supply of air from without. Where ventilation may be more safely left to take care of itself, it is more likely to be left to do so altogether. In the country tenement, the ceiling, if there be one, is lower than in the town, the roof of thatch is more close than that of slate. In the comparative scarcity of fuel, more pains are taken to shut out the cold, less draft of air is caused by fires, and there are less frequently chimney flues in bed rooms. The ground floor is usually open to the chamber over it, both by chinks between the boards, and by the staircase or step ladder; for the foul air to ascend ere night into the bed room, whence its only vent, if any, is by a window perhaps no higher than the floor. Windows which will not open at all are here of more frequent occurrence. Repairs and remedies are more rarely sought for, and more tardily obtained. The picturesque is often studied at the risk of health, not only in the site, but also in the construction of the building; and lest the lodge should look too lofty in proportion to the mansion, its inmates have to sleep on the level of the ground. This very objectionable arrangement is adopted in many country dwellings, where the land is of little cost, in order to save masonry in the walls, or timber in the floor. And the dampness of such ground floor bedrooms is generally enhanced by the lack of spouting to catch water from the roof. But let us now illustrate our comparison, on this point of internal ventilation, by some few striking cases in the evidence. First take a room in Preston, occupied by "a single man, sober, and orderly in his conduct;" earning "18*s.* per week," as night watchman at a mill; the room being "6 feet $9\frac{1}{2}$. in. long, and 4 feet $8\frac{1}{2}$. in. wide," and lighted by a pane of glass in the roof. The small bed which almost filled this wretched room was occupied alternately by the watchman and an old man labouring under paralysis; the latter quitting the bed when the watchman returned from his nightly duties, and entering it again when vacated in the evening." (I. 181.) Compare with this the case of shepherds, breathing all day long the purest air on the mountains of France, and yet generally subject to scrofulous complaints, owing to "the circumstance that they pass the night in a confined hut, which they transport from place to place, and which guarantees them against humidity.

This hut has only a small door, which is closed when they enter, and remains closed also during the day. Six or eight hours passed daily in a vitiated air, and which no draught ever renews, is the true cause of their disease." (I. 70.) Next view one more case of a Liverpool cellar. "Some time ago I visited a poor woman in distress, the wife of a labouring man. She had been confined only a few days; and herself and infant were lying on straw, in a vault through the outer cellar, with a clay floor impervious to water. There was no light nor ventilation in it, and the air was dreadful. I had to walk on bricks across the floor to reach her bedside, as the floor itself was flooded with stagnant water." (I. 277.) Add to this another town lodging, thus described by a surgeon in the metropolis: "On reaching her home, I found that it consisted of one corner of a room, on the first floor of a house in Peter Street. The landlady of this room, who herself occupied the central part, near the fireplace, had tenants in the other three corners, in one of which was a widow with three or four children." It appears further that this tenant of the fourth corner, whilst confined at home by a broken rib, in order to obtain the means of paying her rent, "underlet half of her bed." (I. 68.) Bad as these cases are, they are not worse than the following description from St. Kilda, one of the Western Islands of Scotland, of which "the air is good, and the water excellent," but where nevertheless "the population is diminishing;" "partly owing to the prevalence of epidemics," but chiefly to the excess of infant mortality, where "eight out of every ten children die between the eighth and twelfth days of their existence." Here "the huts of the natives are small, low roofed, and without windows; and are used during the winter as stores for the collection of manure, which is carefully laid out upon the floor, and trodden under foot, till it accumulates to the depth of several feet." (I. 140.) This is, it must be owned, an extreme case, and in a remote region. But it is within the realms of Britain, and its date is in the 19th century. And occurring, as it does, incidentally in the evidence, it serves to shew to how great an extent the best of air out of doors may be frustrated by bad management within. At the same time it leads us to expect, that if a commission were to issue for reporting on the state of dwellings in the country, it would bring strange scenes to light. Though it be true that in towns these evils are accumulated, they are also there within the focus of public observation; and they cannot but sometimes excite attention, and get remedied. But in the country it is impossible to say how long or how far they may go on, unnoticed, and unreformed.

In regard to public buildings, as Churches and Schools, and as to the crowded state of the bedrooms and of beds, and other domestic arrangements affecting health and decency, the country,

though susceptible of much improvement, seldom contains cases as bad as the towns, owing to the lower cost of space. It is also comparatively free from that promiscuous profligacy with which our towns are abundantly disgraced. In point of drunkenness the balance is more nearly even. For if the gin shops prove tempting to the inmate of a cheerless town cellar, it would be easy to match such cases, however numerous, with the no less cheerless hovel in the country, having the village public house hard by; each class of building yielding to the landowner some ten per cent. upon its value as a tenement; in the one case wrung out of the savings of hard work upon poor fare, in the other flowing over freely from the gains of ministering to drunkenness. As to smoke, and gas, and other like nuisances, they that dwell in the country have nothing to complain of. Instead of noxious trades their employment is the most healthful of exercise; and this ought to be taken into account, besides the purity of their atmosphere, as one cause of their higher average of health and of longevity. There are however some districts in which the pursuits of agriculture, and the health and morals of the people, are sacrificed to the vanity of fattening and slaughtering the largest possible quantity of game. In these cases almost the whole rural population may be divided into those who preserve and those who poach. The habits and feelings hence arising, the night watchings and outrages, the heartburnings and cruelties, the perjuries and treacheries, the inuring of the peasantry to snares of ambush and to deeds of violence, as well as the steps by which they rapidly descend from such breaches of the law as they are apt to palliate, down to crimes which every man's conscience must condemn, these are matters which need no proof of evidence, and which are at once injurious to the health, and seriously detrimental to the morals, of many a rural community. And this leads us to the important point of social morality, as largely influenced by the due mutual connection, and beneficial intercourse, between one class of society and another. We have noticed in towns the injurious estrangement between the employer and the employed, as it is promoted by circumstances, which induce the one to reside as far as possible from the neighbourhood of the other. Whilst the merchant, the manufacturer, and the tradesman, as well as members of the learned profession, are thus migrating into the country as far as they can, the landowner and his family are often seen to desert the advantages of the country, except perhaps for a few weeks in the sporting season, for permanent residence within the circle of a town. Places like Cheltenham and Leamington, not to mention whole colonies of wealthy English on the Continent, suggest to the reflecting mind the thought of many an empty rural mansion; at which the owner, were he living on the spot, instead of spending his income

among strangers, would find his proper sphere of happiest employment, and the best scene of education for his children, in doing good to all around him; in administering the law for the redress of wrongs, and for the settlement of disputes, in bountifully relieving want, and displacing ignorance by intelligence, in multiplying the products of the soil, and diminishing the drudgery of the labourers, and in promoting, by eminent example, the influence of that holy faith, which is able to refine the vile, to ennoble the base, and to enrich the most abject poor. Such residents on their own estates there are; I know of hundreds, nobility, and gentry, and I rejoice to think that there are thousands; who consider the duties of property no less sacred than its rights, and who consult the wishes and feelings of their tenants, as well as their wants and interests; whose generous principles, and considerate behaviour, in the expenditure of their ample incomes, well seconded by the agency of stewards at once upright and liberal, form a safeguard to all property, a bulwark to all liberty, and one of the chief glories of our land. But it must be confessed that there are cases also, it may be hoped not many, and it concerns the State to provide that there be none, in which the welfare of a whole rural community, in such matters as the healthiness of their dwellings, the extension of their gardens, the requisite enlargement of their church, or burial ground, or school, or the improvement of the education of their children, are sacrificed to the ignorance of an arbitrary squire, or to the apathy of a superannuated incumbent, to the tedious incapacity of a minor, or to the antiquated prejudices of a dowager, to the callous necessities of a spendthrift heir, or to the obsequious edicts of a relentless agent. In proportion as cases like these occur, coupled with the childish eagerness to multiply game, at the cost of wasting more grain than we import, in the face of a rapidly increasing population, and in violation of the feelings, the morals, and the liberties which appertain to a Christian people; there is reason to apprehend, in the country, no less than in our towns, a loosening of the best of social bonds, the sense of neighbourhood and of brotherhood between man and man.

May 10. 1845.

LETTER XII. — APPLICATION OF REMEDIES.

IN this concluding letter I propose to consider the general means which are applicable to alleviate, remove, or obviate the evils of which I have given evidence, and of which I first submit a short summary; site of towns, streets, and houses, injudiciously

selected; surface water not drained off; insufficient supply of pure water for use; inadequate arrangements for riddance of refuse; and hence arising an atmosphere laden with damp and putrid exhalations; this unhealthy state of things out of doors, aggravated by crowding into close and filthy apartments within; various local nuisances contributing more or less to the further pollution of the air, as smoke, gas, noxious trades, and overflowing charnelhouses; places of public resort being often in a worse state than private dwellings; and the country shewing less attention, if possible, than the towns, to points of prime importance to health, because less liable to suffer by the neglect of them. Hence follows an enormous amount of sickness and mortality (1); of which one witness states his opinion that a third part might be saved immediately, and at least half ultimately, by due precaution. (See I. 84.) Another medical man, speaking of the metropolis, observes: "The result is the same as if twenty or thirty thousand of these people were annually taken out of their wretched dwellings and put to death; the actual fact being that they are allowed to remain in them and die." He also corroborates the statement, that "The annual slaughter in England and Wales, from preventible causes, of typhus fever, which attacks persons in the vigour of life, is double the amount of what was suffered by the allied armies in the battle of Waterloo." (I. 4.) Another witness shews, that in Preston, there are districts in which the average length of life is diminished by these influences from 47 years to 18. (Vol. I. 196.) In Nottingham a similar result is established. (See I. 334.) Whilst as to Liverpool, where sickness and death are more prevalent than in any other town, one who knows it well, after describing some of the worst of its abominations, expresses his surprise, that "the mortality, taking all things into consideration, is so exceedingly small." (I. 273.) Further there is a very serious diminution of the strength and spirits of those whose life under these adverse circumstances is spared. And there is a diminished capacity for enjoyment during their shortened period of existence; together with that which is most painful to the humane observer, an indifference to the evils which surround them. With all this it does not appear that the increase of the population is hindered, but rather the contrary; a sickly progeny springing up, in numbers proportionate to the early marriages and premature infirmities of the parents; yielding, instead of vigorous men and women, a community prone to pauperism, and supplying, in the excess of infant mortality, "an unripe harvest for the scythe of death." (I. 197.)

(1) It seems highly probable that the tendency to pulmonary consumption, supposed to arise from the nature of our climate, is rather ascribable to those habits of carefully excluding all access of fresh air into which we have been led by the variable nature of our weather.

Meanwhile there is a rapid deterioration of moral and religious principles and practices; together with a strong tendency to the most vicious sensual propensities; insomuch, that, if we could have a map made for the whole realm, as has been done for the town of Preston, "shaded in those districts which are ill ventilated, drained, and cleaned," with the cases of disease, of death, and of criminality, indicated by different coloured spots, there can be no doubt, that it would prove, in one case, as it does in the other, "that dirt, disease, and crime are concurrent." (I. 182.)

In the course of these letters, as each source of mischief was pointed out, the appropriate remedy has been at the same time mentioned. There are certain miscellaneous measures of improvement which must now be briefly touched upon; after which we may consider the general means by which any improvements may best be brought to bear. Parks and public grounds for recreation, in the outskirts of a town, secure at once fresh air and scope for healthful exercise. Those which were from of old have mostly been either encroached upon by building, or engrossed by one class of society, to the exclusion of the rest. And many a new metropolis of manufactures is wholly destitute of any such convenient outlet for its closely confined inhabitants. In some instances, however, active measures are now in progress for securing these advantages. It would be well if gardens for the operatives were included in the scheme, and time allowed for the people to work in them. Whoever has approached Birmingham in any direction, must have observed the multitude of small gardens with which it is begirt; one of the circumstances no doubt accounting for the fact, that the rate of mortality is there "the lowest of all the large provincial towns in England." (I. 143.) (2) Parks and gardens give room for the growth of trees and shrubs; and these have a direct tendency to purify the atmosphere, provided it be but first pure enough for them to live in it and to thrive in it. Hence squares in a town do all the more service, in proportion as they are well planted. And a plan has been adopted with success in the metropolis, for rearing plants in the dwellings of the poor, with a view to the improvement of the air. (See I. 44.) A taste for such embellishments is itself an important element of amendment, according to the remark of one of our most valuable witnesses: "Something may be hoped for in a people who can feel a joy in flowers, and cultivate roses and geraniums in the polluted atmosphere of Holden's Square and William Street." (I. 199.) Another improvement, in which we are at present making some progress, is the substitution of cemeteries in the suburbs for the

(2) Another principal element of the healthfulness of Birmingham is that in that town there are "no cellar residents whatever." (I. 143.)

further use of our crowded town churchyards. Another is the establishment of public baths; and, in connexion with them, or separately, of public wash houses, for the use of those whose abodes have no such convenience in private. An account of such institutions, as established at Liverpool, and as projected at Ashton under Lyne, may be found in Vol. I. 296. 302. As to the healthfulness of bathing, under due limitations, there can be no question. As to public wash houses, they may be expedient until private dwellings are better arranged; otherwise there is much force in the objection to the promiscuous assemblage of families, that "the evil would preponderate over the good." (I. 273.) Indeed the great object of all our endeavours, more especially amongst a people whose predilections are happily in favour of home life, must be the utmost possible improvement of each individual home. And now that we see the subject taken up by the public, and at the same time see the principles of ventilation applied by Government, with a view to health, at the two extremities of society, in our senate house and prisons, we may hope that all classes will ere long be made partakers of a benefit, which it seems to cost so little to confer. It was a noted commendation of an emperor of old, that he found Rome built of brick, but left it built of marble. There is reserved, we trust, for our own age, and for our own beloved Sovereign, a note of glory more welcome to her heart, that having found the poorer portion of her subjects lodged in dwellings incompatible with health or decency, hers has been the privilege to see their houses improved, and to forward the good work of improving them, and to have them made as cleanly, healthful, and enjoyable by their occupiers, as her own royal palaces by herself.

Much may be done undoubtedly in promoting this object, by Laws, and by their due administration. Much may be done also by Voluntary Societies; and much more by Private Exertion. These are the matters to be now finally considered. As to laws, the jealousy which watches over our liberties renders it no easy matter to legislate on the construction of a man's own home. And yet the legal provision long since made for the abatement of nuisances seems to sanction the law in interfering, to prevent any man from contaminating the atmosphere of a neighbourhood, by breeding a pestilence in his own household. Experienced persons unite in opinion, that without legislative interference no comprehensive and economical measures can be brought into full operation, on such points as drainage, supply of water, ventilation, and the construction of dwellings with a view to health and decency. (See I. 29. 349. II. 302.) Besides enactments to bear directly on these matters, the object must also be borne in mind, and provided for, in the various legislative measures which may indirectly affect it. For

lack of such precaution, we find that the Blackwall Railway Company, which by displacing many tenements added to the crowding of the neighbourhood, and which had plots of ground to spare sufficient for the erection of an equal number of improved tenements, in default of powers to erect them, was forced to let the sites lie waste. (See II. 355.) This remark applies to laws enacting taxes, in which the question of the health of the community has been hitherto lost sight of altogether. Else bricks used for the dwellings of the poor would be discharged from the payment of a duty, which tends seriously to curtail the accommodation provided for them. (See I. 290.) The same may be said of other building materials. And especially is this applicable to the window tax; which operates as a tax on ventilation; an aperture to admit air, though unglazed, being pronounced liable to the duty. (See II. 239.) Light is indeed itself an important element in the healthfulness of a dwelling, much more so than is commonly supposed. We have decisive medical testimony "to the influence of light, not only as a most efficient means of preventing disease, but likewise as tending materially to render disease milder when it occurs, and more amenable to medical and other treatment." (I. 41.) The same witness remarks, that "the more dark corners you have in the dwellings of the poor, the greater amount of filth and dirt." (I. 42.) Another witness points out in detail the pernicious operation of the window tax, and of the mode of assessing it, upon the healthiness of dwellings; and at the same time shews the facility of raising the like amount of revenue without stinting the supply of light and air to a given amount of space. (II. 231. 240.) Besides watching over points like these, the legislature may do much by sanctioning and guaranteeing methods of raising funds for the required improvements, and by apportioning the payment of first cost over a considerable period of time, according to the permanency of the benefit conferred upon the property. This would do away with all excuse for compassing the work so gradually, as scarcely to keep pace with the increase of new buildings, without any remedying of past errors. (See II. 217.) Connected with legislative enactments are the services of public boards and officers, who ought to be at once versed in local knowledge, and independent of local influence. The combination of these requisites, if unattainable in the same party, might be compassed by the united action of a local board with a central authority. The municipal institutions of our towns afford facilities for collecting information, and enforcing rules and orders. In some office of theirs might be deposited models, plans, specifications, and advertisements of all improvements in structure, draining, ventilation, and the like. And amongst their officers one of the most useful would be a surveyor, educated with a view to promoting, in the

erection of buildings, the health of their inhabitants. (See I. 60.) Whilst, at the same time, to control party influences on the spot, there might be a central and paramount authority, in some department of government at head quarters. And the health of her Majesty's subjects may perhaps at length come to be esteemed as of little less importance, than their other affairs, Home, Foreign, or Colonial, Naval or Military, Civil or Ecclesiastical.

In the next place, the cause may be promoted very largely by voluntary associations; a system which seems peculiarly adapted to the constitution of our country, and to the character of our people. At the conclusion of my third letter I mentioned three such societies already formed. Their best course will be the actual construction of healthy dwellings, at such a cost as may prove at once remunerative to the owners, and economical to the occupiers. The evidence shews how much is to be saved, in the laying out of buildings, (II. 356. 358,) in the construction of sewers, (II. 463,) in the supply of water, (II. 31. 33. 151,) and in the gain by manure. (II. 42. 441.) In the life of cattle too the country seems at present to be losing by neglect an enormous sum. (I. 138.) And the mere money loss arising from the sickness and death of our fellow creatures is shewn to be much greater than the expense which would be incurred by effectual measures of prevention. (I. 7. 196, 197. 335, 336.) A fair portion of these various sources of gain might be secured to any company formed for such purposes, compatibly with the public interest. And if private speculation, so prodigal to strangers and to foes in any cause of wealth and luxury, should withhold its finances from a project at once profitable, patriotic, and humane; still there are the earnings of the very class which is chiefly to be benefited, there is the stock of savings' banks and friendly societies, which, under the guarantee of public security, might effect all the improvement, and reap the bulk of the profit thence arising.

But, in the last place, individual exertion is the main thing to be relied upon. Let each man do his part, and set a good example, in his own house, as far as lies in his own power. Let each discharge his duty, in his own ward or township, parish or neighbourhood. Let the wealthy, the intelligent, the influential, first study the subject, and next exert themselves in circulating information, and in removing prejudices. At the same time let them encourage liberally the exertions of the poorer classes to help themselves. Let them remove out of the pathway of their neighbours the stumblingblock of the public house and the beer shop. And let them bear in mind how almost entirely the working man is dependent on others, in all that regards the structure of the house in which he lives. It is very rarely his own property. It very rarely can be. There

was indeed a country once, in which every man dwelt under his own vine, and under his own fig tree; there was a law by which no man's portion of land could be permanently alienated; and there was a woe denounced against those who "join house to house, and lay field to field, till there be no place, that they may dwell alone in the midst of the earth." I need not say what commonwealth that was, nor whence that civil polity was derived, nor how differently our own is constituted, nor how much we lose by wholly overlooking those divinely revealed principles of society, which, with due accommodation to varying circumstances, must ever be of value to all mankind. Enough that we bear in mind this consequence of our own system of things, namely, that with few exceptions, the working man cannot ever have the interest of owner, or even of leaseholder, in the place of his abode; and hence has no voice in settling its original construction, nor any power to alter it, or to adapt it to his wants. So much the more obviously is it the duty of the landlord, to study, not simply his own gain, but the health, the convenience, and the decent habits of his tenantry. And so much the more is it incumbent on the higher classes of society, generally, to devise and to promote the means of bringing it to pass, that if a man be diligent, frugal, sober, honest, and desirous of living in a healthy and decent home, he shall at least have the option of procuring one. This is at present a sheer impossibility, to many of those who dwell in towns, and to not a few dwellers in the country; a fact which ought to be well weighed by those whom it most deeply concerns, the great proprietors of the soil. And to those who are merely occupiers, and who would fain have better dwellings to occupy, I would say, This is a point much better worth your striving after earnestly, than those various questionable objects, to which your attention is apt to be turned by your deluded or designing leaders. Be assured, that your best way to emerge from the hardships of your present condition, is, first, to practise, under any circumstances, honesty, sobriety, frugality, and diligence; and next to direct your energies to objects, in which all classes, and all parties, must admit the reasonableness and the justice of your claims. Such must be your contribution to a cause, to which I hope that all will contribute something. For my own part, if I can do little more than write in your behalf, I feel thankful to have been led to do thus much. I know not how I could have better spent the time, than in digesting these letters from the voluminous Report on the unhealthy condition of your dwellings. Nor could I by any other means have satisfied myself, after evidence so clear of evils so painful to contemplate, except by doing the best I could towards promoting their redress.

May 17. 1845.

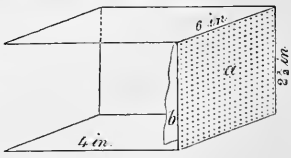
APPENDIX I.

PLANS AND SPECIFICATIONS.

Description of a Ventilator for the Poor.

J. Toynbee, Esq. F.R.S. Vol. I. 77.

Will you describe the ventilation you have introduced? — I advised with a number of persons, and the means adopted were these: — First. A ventilator for the admission of external air through the windows, consisting of a plate of zinc, very finely perforated with 220 holes to an inch. The use of perforated zinc was suggested to me by Mr. Cottam, the engineer, of Winsley Street, Oxford Street, who, having observed the great value of its application by myself in ventilating the rooms of the poor, has lately made use of it in the ventilation of the whole of his extensive establishment. The size of the window ventilators varies from 4 to 12 inches square, according to the size and construction of the room. They are generally introduced in the uppermost portion of the window, and in the corner pane the farthest from the fire place. These fine orifices prevent the air coming in with a rush, which would occasion discomfort, and tend to diffuse the air equally and gently throughout the apartment. In the tap rooms of public houses a revolving ventilator is introduced, which is objectionable, not only in letting in air suddenly or in large quantities, but in making a noise by its revolutions, and being liable to be stopped up. Besides the window ventilator, we have introduced a chimney ventilator, to remove the vitiated air from the room. (1) It was contrived by Dr. Arnott, who was consulted on the subject. This consists of a square iron tube, of from 3 to 6 inches in diameter, and so long that the outer orifice should be flush with the wall of the apartment, and the inner one enter the chimney. These tubes are usually from 4 to 6 inches in length. At the orifice entering the room there is either a plate of perforated zinc or a piece of fine wire-work; from the upper and back part of which hangs a piece of ordinary or oiled silk, which acts as a valve so as to allow the warm and vitiated air to pass up the chimney and prevent any smoke from entering the room.



(1) The later experience of these chimney ventilators proves that the size of the chimneys and the badness of the draught render the benefit to be derived from them very uncertain. Their use is now nearly discontinued.

Have you considered that the apparatus you have introduced might be further improved, to attain the desideratum of a cheap self-acting ventilator with air that is warm as well as fresh?—— I have certainly considered that it might be improved, and that it will be improved when attention commensurate with the great importance of the subject is given to it, and a certain amount of further experience is had upon it.

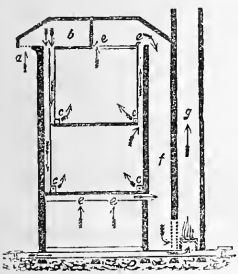
What is the expense of the ventilators now successfully used? — For each window-ventilator, and the expense of fixing it, is 2*s.*; for each chimney ventilator, and the expense of fitting it, 3*s.* The expense would be less if the houses did not lie so far apart, and if more were put in at one time.

2. *Plan for Ventilating the Wards of a Hospital.*

E. Rigby, M.D. Vol. I. 119.

The scheme adopted by Dr. Reid was upon the following plan: —

Fresh air was introduced under the roof *a*, that it might enter from the purest source. From the general air-chamber *b* it descended to the separate apartments. A hot-water pipe *c* gave it a moderate warmth; double glass windows gave additional warmth. A vitiated air chamber *e* regulated by valves received the air from the rooms. The air in the basement was prevented from passing into the wards above by the flue *e*, the air from it with that from the chamber *e* in the roof, passing to the descending shaft *f*, from which it passed ultimately into the discharging shaft *g*.

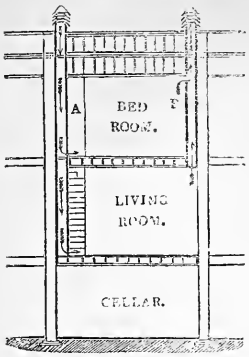


3. *A simple Mode of Ventilating a Dwelling House.*

Samuel Holme, Esq. Vol. I. 280.

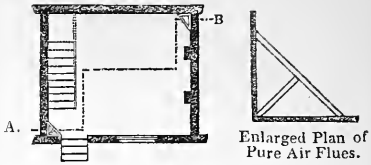
The annexed is a simple mode of ventilating a room, which costs a mere trifle, and if adopted would be very useful: —

[Section through line A. B.]



A. Flues for descent of pure Air.
b. Flue for ascent of vitiated Air.

[Ground Plan.]

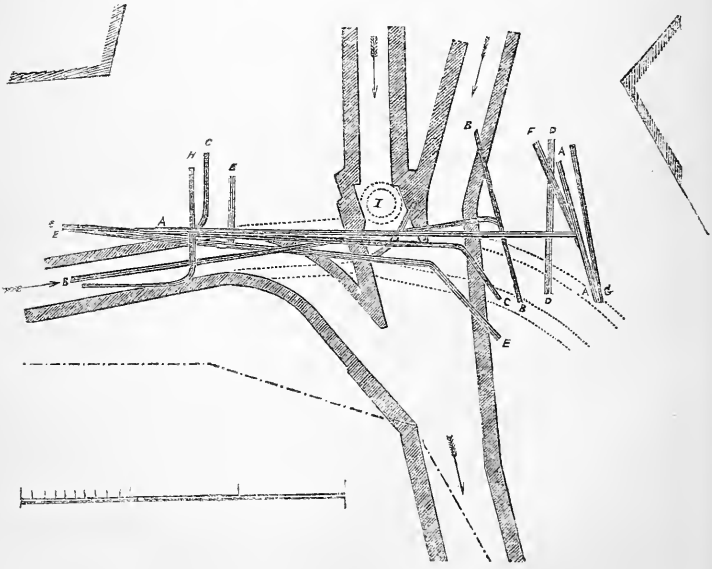


A. Pure Air Flues.
B. Vitiated ditto.

4. *Gas Pipes intermingled with Water Pipes.*

W. C. Mylne, Esq. C.E. Vol. II. 108.

The annexed wood-cut shows the number and intricacy of the water and gas pipes at Upper St. Martin's Lane, where the alteration now being made in the line of sewer has afforded an opportunity of obtaining the specimen: —



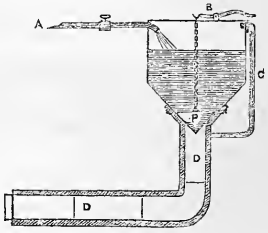
A belongs to Chartered Gas Company, 4 inches diameter.
B belongs to Equitable Gas Company, 6 inches diameter.

C belongs to London Gas Company, 6 inches diameter.
D belongs to Equitable Gas Company, 8 inches diameter.
E belongs to London Gas Company, 12 inches diameter.
F belongs to New River Water Company, 10 inches diameter.
G belongs to New River Water Company, 6 inches diameter.
H belongs to New River Water Company, 5 inches diameter.
I is the man-hole for entering the sewer.
The dotted lines mark the old sewer in the centre of the former street. The other line shows the old lines of the houses.

5. *Apparatus for flushing House Drains.*

W. D. Guthrie, Esq. Vol. II. 243.

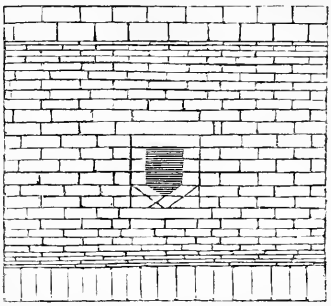
The mode of flushing which I think superior to any system yet in operation may be thus shortly described: presuming that the existing defects in private drains have been remedied by the substitution of strong tubes of small calibre, and presuming that there is an arrangement in each tenement for carrying off the soil by water, then all that is necessary to secure perfect cleanliness is to erect a water-tank or reservoir, of dimensions suited to each individual case, in such a situation that its contents, when suddenly evacuated, may sweep the whole length of the private sewer, filling completely its interior, and thereby effectually carrying every impurity before it on to the street or common sewer. Houses having water laid on need not be subjected to additional water-rates for a supply to its flushing tank, for if the rain water were conducted to it in the manner represented in this diagram, the purposes of flushing would be perfectly attained. Let the water from the roof enter the cistern at A, as represented in the woodcut. Should the fall of rain be greater than the cistern is calculated to contain, the surplus may be carried off by the waste-pipe C, on which a valve of simple construction should be placed, to prevent the effluvia rising from the drain tube D D. The flushing operation is effected by suddenly depressing the lever B, thereby elevating the plug P at the apex of the conical reservoir, the whole contents of which would immediately rush out with such force as to sweep everything through the house-drains on to the main.



6. *Improved Method of connecting Drains with Sewers.*

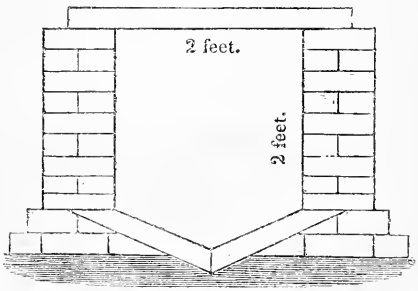
Mr. Hugh Biers. Vol. II. 284.

Proposed method of entering the sewers, by which but a comparatively small Portion of the springing wall is cut away, and the usual bond of the brickwork is retained.



7. *The same Principle applied to a Surface Drain.*

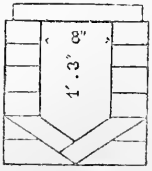
The same Principle of Construction applied to a Sewer for Surface or Upper Drainage.



At 6 feet depth of digging this sewer will cost 7*s.* per foot lineal. For every additional course in depth add 10*d.* per foot lineal.

8. *The same, as Substitute for a Barrel Drain.*

The same as substitute for Barrel Drain.

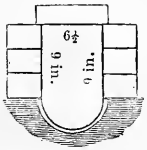


The area is the same as that of a 12-inch barrel drain.

I have very often constructed drains to the smaller houses, according to this drawing, with a tile bottom, bricks on the sides, and covered with a stone or a brick, and I find that much better than the 9-inch barrel drain, which requires so much mortar to fill up the outsides of the joints, and besides being so much cheaper.

9. *Another Substitute for a Barrel Drain.*

No. 9. — Section of a Drain equal in Area to a 9-inch Barrrel Drain, but much cheaper in construction, adapted in the smaller description of houses.



Cost price, 10*d.* per foot; the bottom, a strong garden-drain tile.

On what do you lay the tile? — On the earth itself, and the brick side, just clear of the tile.

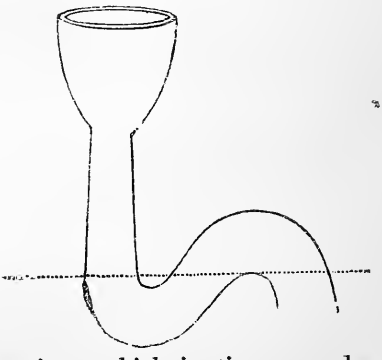
Is not there a bad joint? — No; if it is flushed in with a little cement it makes a much stronger description of drain than the 9-inch barrel-drain.

If they were made of tiles well burnt, and glazed inside, would they not give a freer waterway than those made of bricks? — Yes.

10. *Improved Soil Pans.*

Strethill O. Foden, Esq. Architect. Vol. II. 315.

No. 1.

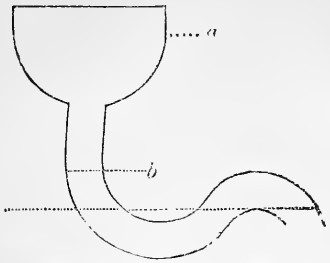


In various private houses, soil-pans with traps are in use on one common principle. A soil-pan of the description displayed [No. 1.], made of lead, has been in use 18 years in a private gentleman's house; and is found to act very well.

The following [No. 2.] is the form of a soil-pan and trap made of iron, which has been in use in several hundred instances. The objection is to the material, which is of cast-iron, which in time corrodes. The filth is then apt to adhere to it.

Another form is the following, [No. 3.], sold by Mr. Wiss, of Charing-cross, which possesses advantages for places, where it

No. 2.



No. 3.

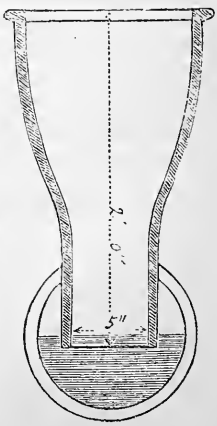
may be difficult to get height or room. The top is of earthenware, the bottom portion is of lead.

11. *Another Construction of Soil Pans.*

Strethill O. Foden, Esq. Architect. Vol. II. 316.

It is stated that at Huddersfield and other places the use even of the cheaper water-closets has been introduced among the labouring classes, and that at Glasgow, in new houses built for the working classes, the use of soil-pans has been introduced. Have you sufficient experience in London to justify the conclusion that a similar apparatus would be acceptable and available for houses of the poorest labouring classes? — Yes, in Cross-street, Hatton-garden, a house has been let as a lodging-house in separate floors and separate rooms, to people of the working classes; there are six or seven families in the house; this house has been recently repaired, and one pan has been fixed in a part of the premises for the use of the whole house; there is a cistern on the top of the privy; the bricklayer, a man of the name of Prime, in St. John-street, Clerkenwell, informs me that it "answers most admirably." These are his words. He proposes to find the pan and fix it complete, and connect it with a drain in any old tenement in any part of the London district for 1*l.* each, privy superseded. The laying on the pipe would be extra, and it would be a varying charge, according to the distance of the supply. From this experience he has purchased several of these pans to fit up in other places in the same neighbourhood, which is chiefly inhabited by the poorer classes.

No. 5.



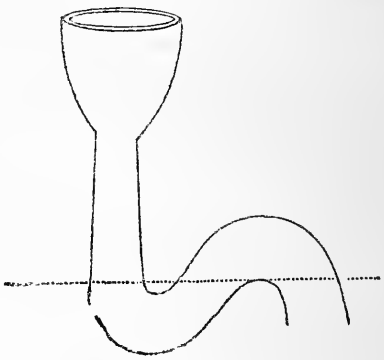
Where there exists any common privy, and when a constant supply of water at high pressure may be obtained, do you think the

principle of the soil-pan you have described available in that or in any other form? — Yes. The soil-pans I have described I have used for the inside of houses; for the outside I have used pans of the annexed form [No. 5.]. The pan and pipe is in one piece — set to dip into the water which stands in the drain, means being provided to flush it out occasionally. This would do admirably where a running stream could be made the means of flushing.

12. *Another Construction of Soil Pans.*

Mr. David Thorp. Vol. II. 333.

Do you not consider that an apparatus of the nature of a water-closet may be made so cheap as to be generally applicable to labourers' tenements? I have no doubt of it; indeed I have had experience of it. I have constructed water-closets for the Hull gaol, which closets consist of an iron soil-pan and pipe, on the plan annexed. The soil-pan is about 10 inches in diameter, the pipe about 5 inches, and made of iron; the pan and pipe are joined together by what is called a bell-end, run in with lead. I am not prepared to state their cost, but if numbers were made they might be made at low prices; less than 1*l.* each. This same kind of closet made of earthenware may be fixed at about 8*s.* each. I know a person who has just fixed them at some of the lock-ups in the neighbourhood; I believe they are made at Chesterfield.



How do they act? It is quite sufficient to prevent any smell coming into the room from the drain; and it passes the soil and everything well, although there is no regular supply of water, and only such water is used as may be put in from time to time, the soil-pan being in fact used as a sink. But it would be a proper improvement to have regular supplies of water, and then the apparatus would work completely.

13. *An Instance of faulty Arrangement of Dwellings, and Plan for its Improvement.*

Henry Austin, Esq. Vol. II. 356.

What means would you suggest for ensuring the greatest amount of ventilation, with a due regard to the economical disposition of the houses? A healthy state of the atmosphere is not at all times secured by wide spaces; it is infinitely better

provided by judicious laying out of property than by requiring thoroughfares of certain dimensions; nor will large and lofty rooms avail while the external atmosphere is pent up, and the rooms themselves crowded to excess, and no means provided for carrying off the vitiated air. As no limit can be set to the number of the inhabitants, a large room is productive of evil, and a lofty room without proper means of ventilation will not ensure such a healthy state of the atmosphere as a low room with such provision, while the former, as it greatly adds to the cost of building, tends directly to the increase of rents and to further over-crowding. The erection of houses back to back, I do not consider would be in the least objectionable, with proper space for yard or other external accommodation for water-closets, dust, &c. To build against three of the four sides of a house should certainly be prohibited. A yard on the side of a house would in all cases be preferable to the back, being ventilated from the street, and readily accessible for the removal of refuse, while back yards of small tenements being completely surrounded, receive no ventilation, and being more out of sight, are generally receptacles for dirt and filth suffered for a length of time to accumulate and decompose. I have endeavoured to illustrate these views by the accompanying plans and sketches.

Fig. 1. is a plan of an existing court in Westminster, called

"Snow's Rents," a striking example among many worse, of the dreadful condition to which the poorer classes are reduced from the want of proper structural arrangements and control. This court is of considerable width, upwards of 20 feet, but the houses are mostly without yards, and the refuse, when become intolerable inside the houses, is deposited in the court itself, the whole centre being a pool of black stagnant filth, that accumulates from time to time, and is left to decompose, and infect the whole neighbourhood. A sketch would convey but a poor

Fig. 1.

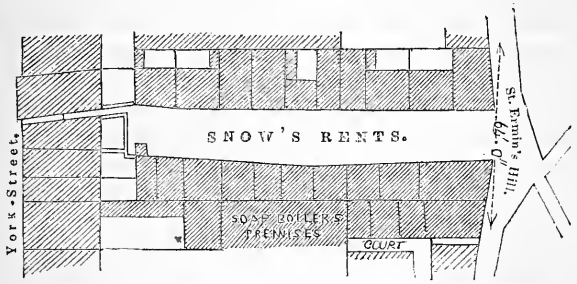


Fig. 2.

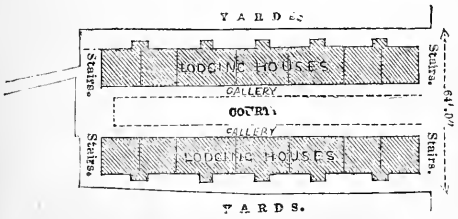
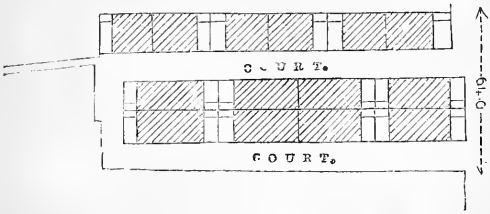


Fig. 3.



idea of the wretched character of this place, but I only wish I could accompany it with the faintest notion of the awful stench that is engendered there. Ventilation, or rather a healthy state of the atmosphere, is impossible. What little disturbance of the air does take place, would appear only to render its state more intolerable. However much the air may be vitiated inside the houses, this is the state of the fresh air to replace it, and no wonder that the wretched inhabitants should not be

anxious in such cases for ventilation. The chief reasons for this dreadful state are the want of yards to the houses, and the width of court being greater than required for the traffic. Had the court been narrower, this accumulation could not have taken place, for the houses would have been inaccessible, and some other provision for the refuse must have been made. Had back yards, however, been adopted, the case would have been nearly as bad, as they would have been quite incapable of ventilation. In juxtaposition with this plan, I have shown a method of laying out the same space of ground by which these difficulties would be overcome, and the whole width of the property, upwards of 60 feet, would be admitted to a free circulation of air, and a small yard with privy and dust-hole provided to each cottage. Comfortable and healthy accommodation would be procured in this arrangement for even a greater number of inhabitants than at present, and this would assuredly invariably result from judicious attention to the disposition of the houses in all such cases. Were this important subject strictly attended to, and other structural arrangements carried out under one good general system, I am prepared to show that property of this description would produce better returns, while the poorer classes would obtain the benefits of ventilation, drainage, and good supplies of water without addition to their rents.

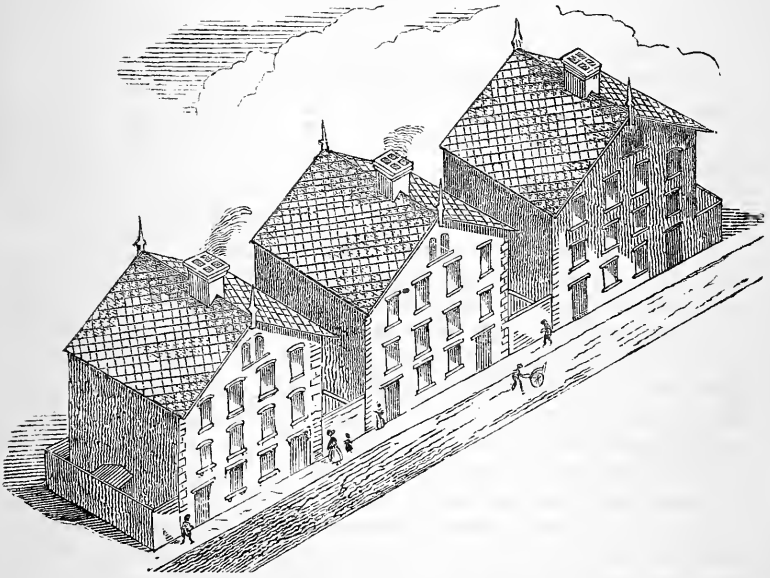
What is the condition of this court with regard to drainage and the supply of water? There are none whatever there. In wet weather, when the water attains a certain height in the court, it finds its way into an open, black, pestilence-breathing ditch in a neighbouring court; but in the ordinary state of things the whole centre of this place is one mass of wet decomposing filth, that lies undisturbed for weeks, from which, so dreadful is the effluvia at times arising, that in the tenants' own words, "they are often ready to faint, it's so bad!" The supply of water consists in this: that sixteen houses are accommodated with one stand pipe in the court! On the principal cleaning day, Sunday, the water is on for about five minutes, and it is on also for three days in the week for one half hour, and so great is the rush to obtain a modicum before it is turned off, that perpetual quarrelling and disturbance is the result, and water-day is but another name for dissension.

Is the court well supplied with privies? No; there is one exposed privy at the end of the court for the use of the inhabitants, male and female, of nine houses, which has not been emptied for four years or more, and in seasons of wet is actually overflowing with soil.

Have you formed any estimate of the expense and probable return which might be obtained from the erection of houses on the same ground of an improved construction? The accompanying plans exhibit different methods of laying out the space of ground, called Snow's Rents, with a view to perfect ventilation,

either as private lodging-houses, adapted for letting each floor separately, or as private dwellings. My object in producing these plans is to substantiate the opinion above expressed, not only as to the incalculable benefits that would result to the poor and industrious classes from their habitations being constructed under a proper system and judicious regulations, by a superior class of capitalists, but also as to the opportunity it affords for an excellent investment of capital. I have estimated these buildings on a liberal scale, and the result more than confirms that opinion, as the following summary will show. The estimate for a row of buildings, as in *fig.* 3, including yard, perfect drainage, self-acting water-closet, dust-bin, water laid on to each floor, and annual supply, ground-rent, and insurance, amounts to 4500*l.* There are seventy-eight rooms, the average size 132 square feet, being larger than the existing rooms, and according to the present rate, would accommodate about 200 inhabitants. The average rental now paid in this vile place, 2*s.* 4½*d.* per week per room, about 11¼*d.* per head, would return upwards of 10 per cent. upon the outlay necessary for substantially building the whole, with every structural arrangement requisite to render them healthy and comfortable dwellings.*

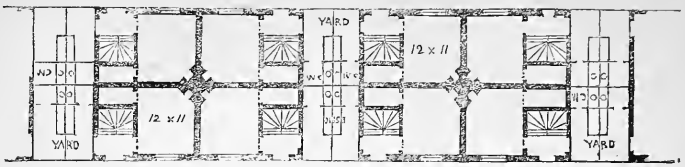
Proposed "Back to Back" Houses as in *fig.* 3.



Plan of proposed "Back to Back" Houses as in *fig.* 3.

* See Note on p. 76.

COURT.



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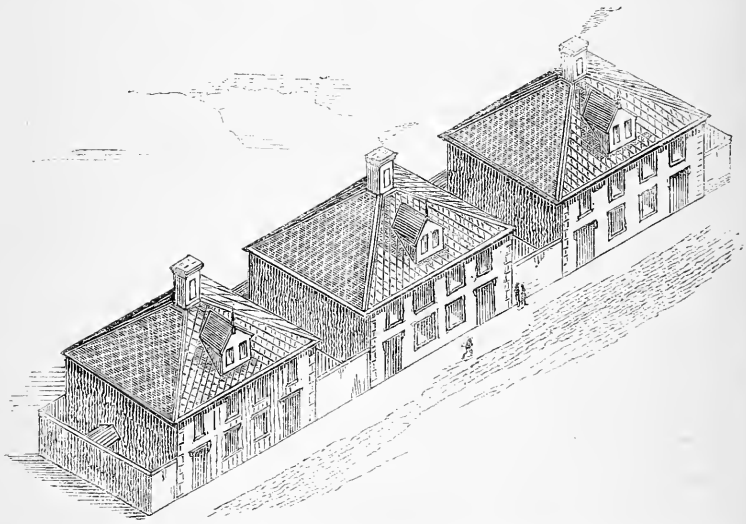
Proposed "Back to Back" Houses for Open Districts.



NOTE.—The following statement has been furnished by Mr. Austin, converting the charge for water, ground rents, and insurance into an annual expense:—

	£	s.	d.
The erection of the 18 houses complete, as in *fig.* 3., will amount to	2,267	0	0
The paving and divisions of yards, the erection of water-closets, self-acting apparatus, dust-bins, main drain in court and drains from houses, cisterns, water-pipes for supply in every room, sinks, cocks, &c., complete	620	0	0
Contingencies—say	113	0	0
	£3,000	0	0

The 18 houses contain 78 rooms.

The average cost will be 166*l.* 13*s.* per house, and 38*l.* 10*s.* per room.

An average rental of 2*s.* 4½*d.* per week per room will return	481	13	0
The annual expenditure in repairs, collection of rents, water rates and taxes, ground rent, and insurance, will amount to	160	11	0
Remaining per annum	£321	2	0

Being upwards of 10 per cent. upon the outlay.

It has always appeared to me that many great advantages would result to the poor, if the erection of their dwellings could be undertaken by a better class of men than those who usually construct them. It is an object well worthy the attention of capitalists, the erection of suitable houses for the accommodation of the poorer classes; for, while improving their condition, a good interest for capital would be ensured. Several attempts of the kind to ameliorate the condition of the humbler classes have at various times been made, and it may excite wonder that they should not have succeeded; but the reason of their failure appears to me to be simply this, that the independence of the tenants has not been preserved. These institutions have been planned in their structural arrangements, on the basis of hospitals and similar establishments, entirely of a charitable and dependent nature. The privies, wash-houses, water, and other necessaries, have been in common, and the inmates, being thus constantly thrown together, continual disturbance has been the invariable consequence, and hence the necessity of a control being exercised, which those possessing the means of providing other accommodation, and so far being independent, will not brook; such institutions, to be successful, must be removed in their character, as far as practicable, from any appearance of charity or dependence. The object should be to render the tenant's position an independent and responsible one. One man's habits or interest should interfere as little as possible with his neighbour's. All things necessary for his comfort being provided, he should be made to feel that the possession of it depends entirely on his own good conduct. With such inducements for improvement, he will soon discover that he has a responsible part to act, and become a better character. I am convinced that it is only by placing the inmates entirely on an independent footing that such institutions can permanently succeed.

In the accompanying plan I have endeavoured to embody the chief requisites for such an institution, but in a single sketch this can only be very imperfectly accomplished. The building

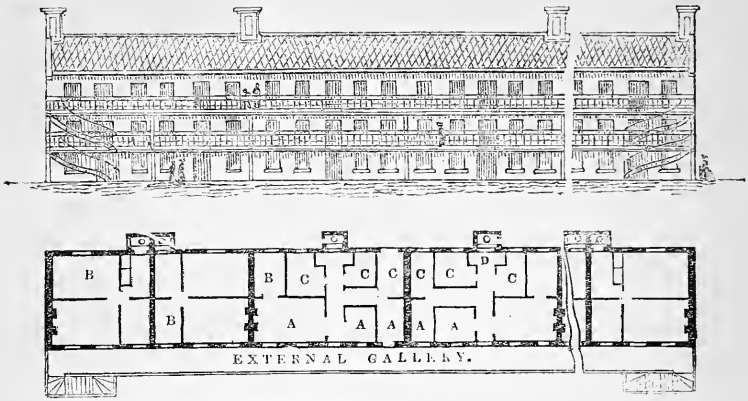
---

Such buildings should be entirely free from all kind of ornament tending to increase the expense of erection in any degree that would occasion the least additional tax upon the tenants; but that the dwellings of the poorer classes should at all times present as cheerful and neat an appearance as possible, is a matter of more importance than would be generally imagined, as tending, without doubt, to a corresponding effect upon the inhabitants themselves. With a proper exercise of judgment and taste, however, much may be frequently accomplished towards this end, and somewhat of an architectural character obtained at the same time with little or no additional expense.

The diamond slating, shown in the accompanying sketches, produces a very ornamental effect in execution; it is more economical than the ordinary slating, and possesses other important advantages.

should be so arranged as to accommodate the greatest number that it conveniently may, but with as perfect a separation as

Lodging Houses, Elevation and Plan of, as in *fig.* 2.



Open Stairs. Open Stairs.

A. Living Rooms.
B. Bed Rooms.
C. Separate Bed Rooms for single Lodgers.
D. Dust and Coals.

can be required. All the rooms should be small; it is surely better that different branches of a family should sleep separately in small rooms than in one large one, or that one man should occupy a room little larger than a closet, provided ventilation is secured, than share with others a much larger space. Every separate set of apartments should be provided with a water closet, perfectly ventilated, and should have dust bins, sink, and coal closet. The apartments should be arranged in different numbers to suit the requirements of different families, to avoid underletting. The rooms let out as separate sleeping rooms should each be provided with water and basin, and have access to a water closet. Nothing should be in common throughout the building, except the passages and staircases, and these should invariably be external in front of the building, and treated entirely as the public footways. The passages should be in the form of galleries, constructed of open iron work, that the light may be unobstructed, and that greater cleanliness may be preserved. Staircases of the same material should be provided at each end, that every portion of the building may be equally accessible. The external character of such buildings should be neat, but as plain as possible, and, above all, devoid of all appearance of public establishments.

14. *Mode of using Boning Sticks in draining Land.*

Mr. James Dean. Vol. II. 427.

Will you, for the information of non professional persons, describe shortly the mode of using boning sticks? — I will here describe the boning rods. They are rods made of deal, 2 inches wide, clean and straight grained. These rods have a stake each, made of inch square oak, 2 feet long, pointed at one end to drive into the ground. To these the rod, which is 4 feet 6 long, should be tied. At the top of the rod there is a cross piece, 9 inches long and 3 inches wide. (See *fig.* 1.) One side of this cross piece is painted white and the other side black, that they may be seen the better in different atmospheres. The whole is of the form shown in the annexed sketch, with a rod tied to the stake, which is fixed in the ground. Any village wheelwright or carpenter may make these rods without difficulty, and at a few shillings expense. There is rarely occasion for more than three of these rods; never for more than four.

Fig. 1.

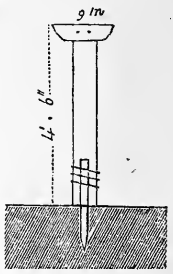
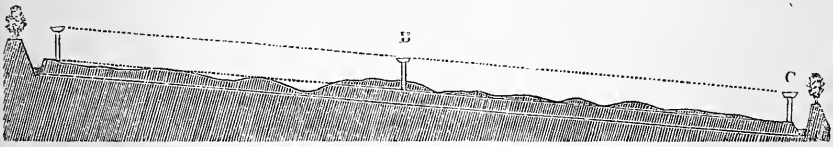


Fig. 2.



Patterns of these rods and builders' levels may be seen, or sets obtained for 30*s.* at Mr. Manning's, builder to the Royal Agricultural Society, 251. High Holborn. Being provided with a set of these rods, we will suppose a piece of ground of irregular surface to be drained. The first thing to be ascertained is, which is the highest and which is the lowest point at the extremities of the piece of land to be drained. On this piece there will be irregularities in the surface, either natural or from repeated ploughings, some portions of the surface being higher and some lower than the extreme points. At the highest point A, drive down one of the oak stakes a few inches into the ground. To that tie one of the boning rods, letting the bottom of the stick rest upon the surface of the ground, placing the cross piece at the top at a right angle with the line of direction to the lowest point C. Then proceed to do the same with another boning stick at C. The workman will then proceed with his spade to a point as near as may be midway between

the rods so fixed. The surveyor will take a sight from one boning rod to the other, and will, by a movement of the hand, direct the labourer until the two boning rods and the handle of his spade set upright are in a line. Having got them in a line, the labourer makes a mark by turning up a little of the soil with his spade. At that point he then places one of the boning rods, holding it at arm's length and standing on one side, so that his body may not interfere with the line of the sight which the surveyor then takes. If the spot on which this third boning rod is now held up happen to be an elevated one, ascertained by the surveyor taking a sight from the boning rod at A to the boning rod at C, and the elevation of the cross piece of the boning rod at B is judged to be about nine inches above the line, the labourer will be directed to lay down the boning rod, and with his spade dig a hole from a foot to 18 inches square, about two spades wide either way, and of the depth which he will judge to be of about 9 inches. Having cleared the bottom of the hole of the fragments of earth, he will again hold up the boning rod, resting it upon the bottom of the hole. The surveyor then takes a sight to see whether the cross pieces are exactly in a line. If they are not so, if the centre rod is too high, the labourer is directed to take out earth, if too low to put in earth and press it down, and this work of adjustment goes on until the three cross pieces are brought exactly in a line. The labourer then drives down one of the oak stakes, and ties the boning rod to it. Then the fourth stick is used between the middle one and either end one, and the labourer proceeds with his shovel to find out the middle between A and B, or C and B (as before). We will now suppose that there is a hollow of nine inches. The same process goes on between the labourer and the surveyor, as in the last case, but the labourer, instead of digging out, adds or raises with his spade nine inches of soil, making it firm, by beating with his spade upon the top; and upon the surface so raised, he drives one of the oak stakes, and ties one of the boning rods, when adjusted by a sight taken by the surveyor, to be in an exact line with the three previously fixed. These rods being fixed, the next point for the surveyor to determine, is what shall be the depth of his drain below the general surface. If the surface be irregular, the first point of care is, that the bottom of the drain be not brought too near the surface at any point of the line; not nearer, we will say, at this point than 18 inches. The leading point now is to ascertain what is the greatest depth that the drain can be placed at the outfall. Assuming that to be three feet, it follows that the depth of the drain at the highest point should not be less than two feet below the surface. The lower bottom line will show the line at the bottom of the proposed drain. The intermediate line shows the general surface of the

ground, which is two feet above it. The workman then proceeds to dig out for the drain to the depth of the lowest line. He digs two holes, one at A, two feet, and one at C, three feet deep below the surface of the ground. He then lengthens out with another piece of deal each of his boning rods two feet. He then drives down into the bottom of the two holes the same stakes that were used in levelling the surface, and ties to the stakes as before, the boning rods so lengthened out to two feet. He will then proceed to dig out the drain, using the other boning sticks lengthened out to two feet, in like manner as the two already fixed; taking care not to get below the run of the line of the bottom of the drain. When by repeated application of the movable boning rods the bottom of the drain has been made to agree throughout with the tops of the boning rods that are fixed, it then becomes the important duty of the surveyor, — going through the same process in respect to the bottom of the drain as was gone through in the first instance with the surface of the land, — to verify the work before a tile, or tube, or stone, or any other material is filled in. Being thus verified, the work is completed.

Have you instructed common workmen to perform this process? — I have. After the first job of a few poles is completed, an ordinary good labourer will go through the whole process as well as any surveyor. The determination of the position of the drains and the number of them will belong, of course, to a higher order of information; or to the class now known as agricultural engineers. Ordinary good labourers will, when instructed, do the boning work without an error of a quarter of an inch upon thousands of yards in length.

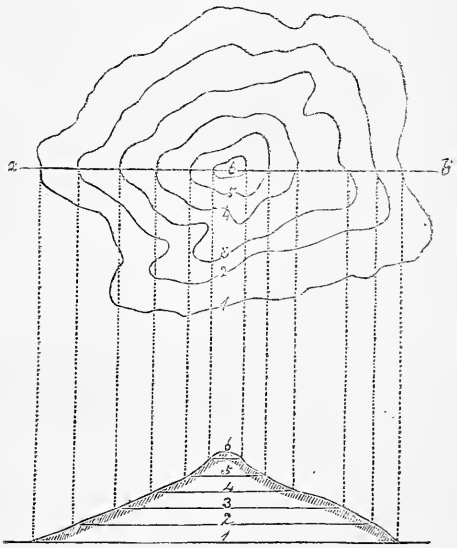
The process of boning, as you have described it, may be stated as being a process for making a straight line in the earth from two given points, or, practically, for ensuring a straight bottom to any drain with any run. Where the outfall is not visible to the eye, as where it may be necessary to carry a drain round a hill, or through a winding street, then, of course, the use of the spirit level, or of the mason's level, will be requisite to find the outfall which cannot be seen, and when once these points are found, the boning sticks may be used as described? — Certainly; good workmen are easily taught the use of the mason's level, and if they were more extensively taught, the frequent failure of very expensive works of town drainage might be avoided. It is important for drainage that common workmen should be taught the simple use of a very common instrument, such as the mason's level, which cannot be put out of order, and expensive service, which too frequently prevents these improvements being made, rendered unnecessary.

15. *The Nature and Use of Contour Lines.*

Butler Williams, Esq. C.E. Vol. II. 449.

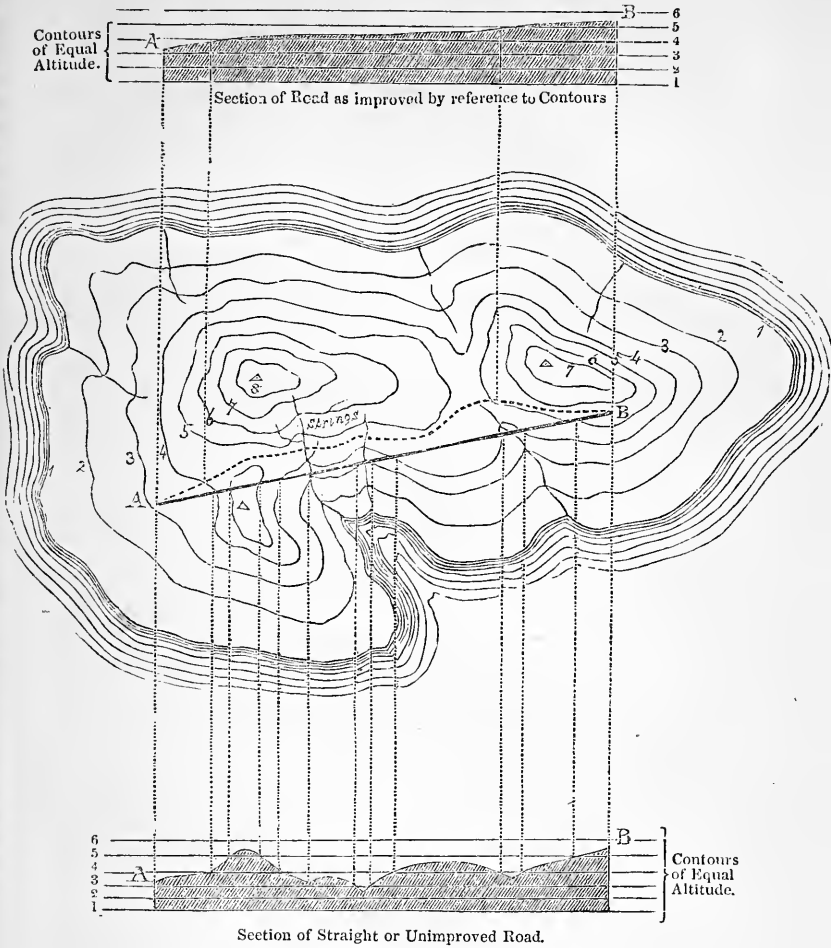
Will you explain the use of the contour lines of equal altitude? — To illustrate the use of contour lines, let a road surveyor be requested to lay out a line of road from A to B (see annexed sketch), he could, by reference to contour lines drawn within sufficiently close limits, select such a direction as would give the most favourable *gradients*, without taking any trial levels, or even visiting the locality. He could, for example, obtain from the plan the section or varying gradients of a road in the direction represented on the sketch by the

Plan.



Section.

straight line A B, and compare its length and its gradients with those of a line of road made to deviate in such improved directions as would be indicated by the contour lines, generally (as shown by the dotted line in the above sketch) increasing in a slight degree the total length of the road, but avoiding backfalls, and reducing the gradient to a minimum amount of steepness by spreading the total rise or fall almost evenly throughout the whole line of road.



16. *Economy of Materials in the Construction of Sewers.*
Butler Williams, Esq. C. E. Vol. II. 461.

The accompanying sketches are designed to show at a glance, and without reference to numbers, the economy of materials in brickwork alone that must be the consequence of adopting the egg-shaped in preference to the upright-sided sewer.

Fig. 3.

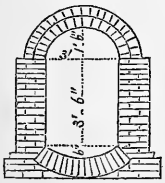


Fig. 4.

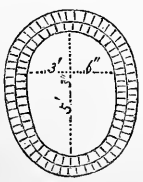


Fig. 5.

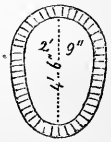
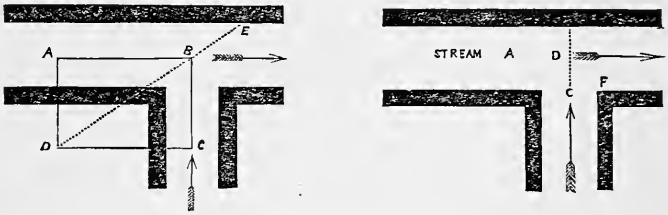


Figure 3. is the section of the Westminster sewer, and figure 4. that of the Finsbury sewer, equally strong, and containing so much less material as to provide, in the difference, for the construction of a sewer somewhat larger than figure 5., which is one used successfully in the Finsbury district for streets or places of short lengths.

17. *Ordinary Junction of Drains and Sewers, and improved Method.*

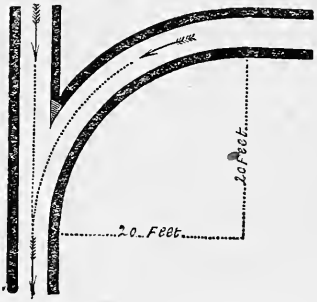
B. Williams, Esq. C.E. Vol. II. 467.

Ordinary Junction of Drains and Sewers.



Improved Method of Junction.

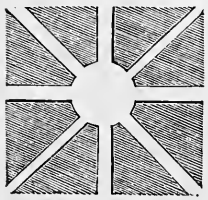
B. Williams, Esq. C.E. Vol. II. 468.



18. *Sir C. Wren's Plan for laying out the Streets of London.*

B. Williams, Esq. C.E. Vol. II. 481.

Supposing a new district of a town to be laid out, the proprietors or projectors would learn much by consulting Sir Christopher Wren's plan. To secure ventilation the streets should be straight, and should radiate from a centre. They will then open directly on the surrounding country; thereby the air will be most readily and continuously changed, and the pure atmosphere of the fields will rush directly through the town, attenuating the noxious gases, and revivifying the used air. The proposed arrangement of diagonal lines affords the most direct access to various distant points, as is proved by the great radiating lines of road which have been opened on the south side of London. The



angles whence the streets diverge might be appropriated as sites of public buildings, and may be rendered thus highly ornamental, while it is doubtful whether it would not be at all times preferable to leave the central space open, or occupied only by gardens, or a fountain, or pillar, than to allow its value as a free breathing place to be diminished by having it occupied by any public building. Public buildings might be made to appear to as great advantage at the sides, and by such an arrangement the central ground would be preserved for light, fresh air, and exercise; or, for that which has been aptly called the "mere luxury of space."

APPENDIX II.

TABLES.

1. *Condition of the Houses of the Poor.*

J. Toynbee, Esq., F.R.S. Vol. I. 67.

In a statistical report made by Mr. Weld, on a house-to-house visitation made at the instance of Lord Sandon, to the Statistical Society in 1842, it is stated that there were in the parish of St. George's, Hanover Square, 1465 families of the labouring classes, who had for their residence only 2175 rooms and 2510 beds. The distribution of rooms and beds was as follows: —

Dwellings.	Number of Families.	Beds.	Number of Families.
Single rooms for each family	929	One bed to each family -	623
Two — —	408	Two — — -	638
Three — —	94	Three — — -	154
Four — —	17	Four — — -	21
Five — —	8	Five — — -	8
Six — —	4	Six — — -	3
Seven — —	1	Seven — — -	1
Eight — —	1	Dwellings without a bed	7
Not ascertained - -	3	Not ascertained - -	10
Total - -	1,465	Total - -	1,465

2. *Health of Workmen employed in large and small Rooms compared.*

W. A. Guy, M.D. Vol. I. 96.

As a still further confirmation of the injurious effects attributed to impure air, I beg to subjoin the following table, founded

upon a careful inquiry into the condition of the men as to health, and an accurate measurement of the rooms in which they were at work: —

——	Spitting of Blood.	Catarrh.	Other Diseases.	Total.	Per Centage Proportion.			
					Spitting of Blood.	Catarrh.	Other Diseases.	Total.
104 men having less than 500 cubic feet of air to breathe.	13	13	18	44	12·50	12·5	17·31	42·31
115 men having from 500 to 600 cubic feet of air to breathe.	5	4	23	32	4·35	3·48	20·00	27·82
101 men having more than 600 cubic feet of air to breathe.	4	2	18	24	3·96	1·98	17·82	23·76

3. *Comparative Mortality in Towns and Country.*

Liverpool. Dr. Duncan. Vol. I. 122.

In the Appendix to the Third Annual Report of the Registrar-General, a statement is given of the relative mortality of a town and country population, amounting, in each case, to upwards of three millions and a half, and combining the results of the observations of two years, 1838, 1839: —

Table 1.

——	Area in Square Miles.	Estimated Population, January 1, 1839.	Deaths Registered in Two Years.	Inhabitants to One Square Mile.	Annual Mortality.
					One in
*Country Districts .	17,254	3,559,323	129,628	206	54·91
Town Districts . .	747	3,769,002	197,474	5,045	38·16
England and Wales	57,805	. .	. .	265	46·00

Another evidence of the greater unhealthiness of towns is afforded by the comparative longevity of the inhabitants of the different districts, as shown by the following table, in which the proportion of deaths, out of every 1000, which occurred at the

* The country districts included in this statement comprise the counties of Cornwall, Devonshire, Dorsetshire, Essex, Gloucester (except Bristol and Clifton), Hereford, Norfolk (except Norwich), Somersetshire, Suffolk, Sussex, Westmoreland, and Wiltshire. The town districts include the Metropolis, Bath, Birmingham and Aston, Bristol and Clifton, Cambridge, Carlisle, Derby, Dudley, Exeter, Leeds, Leicester, Liverpool and West Derby, Manchester and Salford, Maidstone, Newcastle-upon-Tyne, Northampton, Nottingham, Sheffield, Stoke-upon-Trent, Sunderland, and Wolverhampton.

age of 70 and upwards, in Devonshire, Dorsetshire, Wiltshire, Cornwall, Somersetshire, Norfolk, Suffolk, Cumberland, Westmoreland, Northumberland (except the mining part), and Lancashire (North of Morecambe Bay), is contrasted with the proportion occurring at the same ages in the metropolis, Birmingham, Leeds, Manchester, and Liverpool.

TABLE 2.

——	Total Deaths, 1839-40.	Deaths at 70 and upwards.	Deaths at 70, &c., to every 1000 Deaths.
Country - - - -	52,204	10,538	202
Towns - - - -	71,544	6,457	90
England and Wales - -	. .	. .	141

Vol. I. 123.

The following table gives a view of the relative mortality of seven of the principal towns, calculated on the average of the three years 1838, 1839, 1840: —

TABLE 3.

Towns.	Population, 1841.	Deaths.
Metropolis - - -	1,870,727	1 in 37·38
Birmingham - - -	138,817	„ 36·79
Leeds - - - -	168,667	„ 36·73
Sheffield - - - -	85,293	„ 32·92
Bristol - - - -	64,298	„ 32·38
Manchester (Union) - -	192,408	„ 29·64*
Liverpool (Parish) - -	223,054	„ 28·75*

Vol. I. 125.

4. *Low average Age at Death in Liverpool.*

Liverpool. Dr. Duncan. Vol. I. 126.

TABLE 5.

	Average Age at Death.
Metropolis, *i. e.*, Kensington, Strand, Whitechapel, and Bethnal-green Unions - - - - - -	26½ years.
Leeds - - - - - - - - -	21 „
Manchester - - - - - - - - -	20 „
Bolton - - - - - - - - -	19 „
Liverpool - - - - - - - - -	17 „

* The rate of mortality in Liverpool and Manchester is deduced from the average of the five years, 1838—1842.

5. *High Rate of Infant Mortality.*

Liverpool. Dr. Duncan. Vol. I. 141.

I have already shown the high ratio of infantile mortality in towns generally, and pointed out the fact that Liverpool, in this respect, surpasses all our English towns; 53 out of every 100 children born dying before the completion of their fifth year. —(See Table 4, p. 125.) The following table shows the proportionate number of deaths from consumption, and from convulsions, in Liverpool and in the four other largest towns in England, during the three years 1838, 1839, 1840: —

Table 9.

Towns.	Total Deaths (3 Years).	Deaths by Consumption.	Proportion of Deaths from Consumption to		Deaths by Convulsions and Teething.	Proportion to	
			Total Deaths.	Population Annually.		Total Deaths.	Population Annually.
			PerCent.	One in		PerCent.	One in
Birmingham	10,765	1,910	17·74	207	616	5·72	645
Metropolis -	164,420	22,027	13·39	246	11,993	7·29	453
Leeds - -	13,165	2,316	17·59	209	1,612	12·24	301
Manchester	19,969	3,256	16·30	172	2,735	13·69	205
Liverpool -	22,532	4,043	17·94	156	3,365	14·93	188

In the column of convulsions I have included the deaths from teething (710 out of the 3365 in Liverpool), because "teething very generally causes death by convulsions; and the disease in that case might be registered under either title; and because the predisposing cause of death in both cases is the same, *i. e.*, excessive irritability of the nervous system. The numbers in this column embrace children, or rather infants, almost exclusively, 822 out of 869 deaths in one year from convulsions alone, in the parish of Liverpool, having occurred within the first twelvemonth after birth. It will be observed that, in this division of the table, the different towns maintain their accustomed positions; the mortality gradually rising from $5\frac{3}{4}$ per cent. of the total deaths, and 1 in 645 of the population in Birmingham to 15 per cent. of the deaths, and 1 in 188 of the population in Liverpool. Among the 88,000 individuals breathing the purer air of the surrounding district of West Derby (including, however, Toxteth Park, Edge Hill, &c.), the deaths from this cause are only 1 in 334.

In the first division of the table (consumption) the usual order is somewhat departed from, Birmingham giving precedence to London and Leeds, and ranking next to Manchester in point of absolute mortality from this disease, and next to Liverpool as regards relative mortality, *i. e.*, the proportion of the total deaths caused by consumption. Liverpool occupies its usual position at the foot of the table. In London, the mortality from consumption is $13\frac{1}{3}$ per cent. of the total mortality, and 1 in 246 of the population; in Liverpool and West Derby it is nearly 18 per cent. of the deaths, and 1 in 156 of the population annually.

The seeming anomaly with regard to Birmingham, so startling at first sight, may be explained, in a great measure, by the nature of the occupations in which so large a number of the working classes in that town are engaged. Of these, the process of "dry grinding," especially needle-pointing, may be mentioned as being particularly apt to induce consumption, from the inhalation of the metallic particles projected into the air.

6. *Average Age at Death among different Classes.*

Liverpool, Dr. Duncan, Vol. I. 160.

That the influence of these seats of pestilence is not confined to those who reside within their immediate limits, but extends itself to the whole town, poisoning the atmosphere which all classes are compelled to breathe, is shown by the fact that the excess of mortality, as compared with other towns, is found to affect the highest as well as the lowest classes of the community. This appears from the following table, compiled from Mr. Chadwick's Sanatory Report on England, (pp. 158-161.): —

Table 16.

Towns.	Average Age at Death.			General Average.
	Gentry and Professional Persons.	Tradesmen.	Labourers, &c.	
Kendal - - -	45 years	39 years	34 years	36 years
Bath - - - -	55 „	37 „	25 „	31 „
Four Metropolitan Unions	44 „	28 „	22 „	25 „
Leeds - - - -	44 „	27 „	19 „	21 „
Bolton - - -	34 „	23 „	18 „	19 „
Manchester - - -	38 „	20 „	17 „	18 „
Liverpool - - -	35 „	22 „	15 „	17 „

7. *Metropolis and Preston compared.*

Preston. Rev. J. Clay. Vol. I. 167.

Classes.	Average Age at Death, including Children.	
	Metropolis.	Preston.
	Years.	Years.
Gentlemen - - -	44	47
Tradesmen - - -	25	32
Labourers - - -	22	18
	$30\frac{1}{3}$	$32\frac{1}{3}$

8. *Comparative Ages at Death of Three Classes at Preston.*

Preston. Rev. J. Clay. Vol. I. 174.

To show still further the great difference in the probabilities of life, as respects the three classes now treated of, the following table has been framed, showing the progressive decrease in the sum of vitality in the three classes of the inhabitants of Preston. The calculations founded on the ages at death for the six years ending June 30. 1843: —

——	1. Gentry.	2. Tradesmen.	3. Operatives.
Born - - - - - -	100	100	100
Remaining at the end of 1st year -	90·8	79·6	68·2
,, ,, 2nd year -	87·6	73·5	57·5
,, ,, 5th year -	82·4	61·8	44·6
,, ,, 10th year -	81·1	56·6	38·8
,, ,, 20th year -	76·3	51·6	31·5
,, ,, 30th year -	72·3	45·9	25·2
,, ,, 40th year -	63·4	37·5	20·4
,, ,, 50th year -	56·	28·1	15·6
,, ,, 60th year -	45·1	20·5	11·2
,, ,, 70th year -	25·4	13·3	6·1
,, ,, 80th year -	8·	4·5	2·1
,, ,, 90th year -	1·3	·8	·2
,, ,, 100th year -	··	··	·03
	Terminates in the 92d year.	Terminates in the 96th year.	Terminates in the 103rd year.

9. *Effect of Altitude and Density of Population.*

City of York. T. Laycock, M.D. Vol. I. 235.

Table 8.

	Mean Altitude.	Population to Square Rood.	Mean Age at Death.	Ratio Dying under 5 Years to Living at the same Age.	Inhabitants to One Birth Annually.	Inhabitants to One Death Annually			Deaths of Labouring Class per Cent.
						From all Causes.	From Epidemics.	From Pulmonary Diseases.	
Best drained and ventilated parishes	50	27	35·32	3·03	47·50	54·32	347·72	334·22	40·2
Intermediate parishes	43	40	27·79	3·86	36·53	41·41	247·20	219·70	52·5
Worst drained and ventilated parishes	33	63	22·57	3·83	26·82	32·15	129·43	153·00	62·8

It will be seen that as the altitude diminishes, the proportion of the labouring class is greater, and the mean age less. The two extremes show a difference of $12\frac{3}{4}$ years in the mean age of each individual dying.

10. *Prevalence of Epidemics in the Warm Seasons.*

City of York. T. Laycock, M.D. Vol. I. 262.

The following table strikingly exhibits this connection between increased temperature and increased mortality: —

Table 2. — Showing the Mortality in each Month of the Three Epidemics, 1550-1, 1604, and 1832.

	June.	July.	August.	September.	October.	November.	December.	Total Deaths.	Numbers Living to One Death.
Deaths in the Parish of St. Martin cum Gregory, during the prevalence of the "sweating sickness" (?) in 1550, 1551	..	5	21	30	26	18	7	107	2
Deaths during the "Plague" of 1604, in 17 parishes . .	53	249	638	793	115	93	45	1,913	3
Deaths from the "Cholera Spasmodica" of 1832, in the whole city of York . . .	66	98	13	13	1	..	..	185	142

Further proof were scarcely wanting, as the history of all epidemics exhibits the same relations. The table is, however, a curious historical document, and is, I believe, unique.

Indeed, our own modern experience of the cholera of the "plum season" recurs annually to convince us of this connection, and every year people attribute their attacks of "bowel complaint" to eating plums, or toasted cheese, or salmon, or to any cause except the true one, namely, the miasmata evolved from stagnant water, or impure drains, by the heat of summer.

11. *Comparative Mortality in the Drained and Undrained Districts of the Town of Leicester.*

Leicester. Vol. I. 269.

Streets.	1840		1841		1842		Average Age of Death for the Three Years.
	Average Age of Death in.	Proportion from Epidemics.	Average Age of Death.	Proportion from Epidemics.	Average Age of Death.	Proportion from Epidemics.	
East District.	Years.						
Culverted - -	23½	¼	24	1/12	26½	1/12	24⅔
Partly culverted	17½	⅓	21	⅛	21½	⅛	20
Not culverted -	13½	½	18	⅐	17½	⅐	16⅓
West District.							
Culverted - -	20	⅙	30	1/14	29	1/12	26⅓
Partly culverted	21	⅕	23½	⅛	22	1/11	22
Not culverted -	14½	¼	21	⅐	17½	⅑	17⅔
Streets culverted	25½	The 3 years average 21, and rather more.	..	These years were taken because the year 1840 was remarkable for the increase of disease and the number of deaths throughout the town.			
Partly culverted	21						
Not culverted -	17						

THE END.

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